

PATENT ABSTRACTS OF JAPAN

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(54) ELECTROPHOTOGRAPHIC SENSITIVE BODY

(57)Abstract:

PURPOSE: To obtain an electrophotographic sensitive body having high sensitivity and high durability.

CONSTITUTION: This electrophotographic sensitive body contains a triarylamine compd. in the photosensitive layer formed on the electric conductive substrate. The triarylamine compd. has one or more triarylamine skeletons represented by the formula (where each of Ar1-Ar3 is optionally substd. aryl and Ar1-Ar3 may be different from each other) and an alkylencarboxylic ester group represented by a formula $-(CH_2)_m-COOR$ [where R is optionally substd. alkyl, aralkyl or aryl and (m) is an integer of 1-6] has been substd. for at least one of the aryl groups.



LEGAL STATUS

[Date of request for examination]

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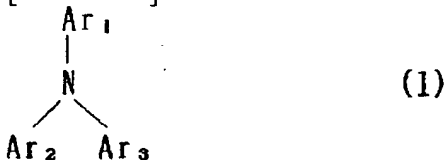
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CLAIMS

[Claim(s)]

[Claim 1] the inside of the sensitization layer prepared on the conductive base material -- a general formula (1) --

[Formula 1]



Or are different from each other. the inside of a formula, Ar1 and Ar2, and Ar3 are the same -- the aryl group which may be permuted is expressed. the thoria reel amine frame shown -- one piece or two pieces or more -- having -- at least one [and] of these the aryl groups -- formula -(CH₂)_m-COOR (R expresses the alkyl group, aralkyl radical, or aryl group which may be permuted, and m expresses or more 1 six or less integer.) The electrophotography photo conductor characterized by including the thoria reel amine system compound permuted by the alkylene carboxylate radical shown.

[Claim 2] A thoria reel amine system compound is a general formula (2). Electrophotography photo conductor according to claim 1 which is the compound shown.

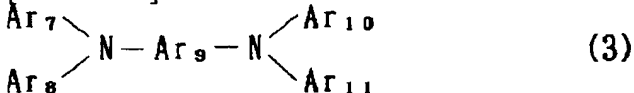
[Formula 2]



(It permutes among the formula by that Ar4, Ar5, and Ar6 are the same or the alkylene carboxylate radical at least one of these the aryl groups is indicated to be by being different from each other and expressing the aryl group which may be permuted by formula -(CH₂)_m-COOR (R and m express the same semantics as the above.).)

[Claim 3] A thoria reel amine system compound is a general formula (3). Electrophotography photo conductor according to claim 1 which is the compound shown.

[Formula 3]



(It permutes among the formula by that Ar7, Ar8, Ar10, and Ar11 are the same or the alkylene carboxylate radical at least one of these the aryl groups is indicated to be by being different from each other and expressing the aryl group which may be permuted by formula -(CH₂)_m-COOR (R and m express the same semantics as the above.).) Ar9 The arylene radical which may be permuted is expressed.

[Claim 4] A thoria reel amine system compound is a general formula (4). Electrophotography photo conductor according to claim 1 which is the compound shown.

[Formula 4]

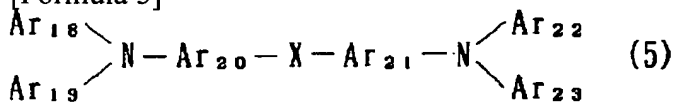


(It permutes among the formula by that Ar12, Ar13, Ar16, and Ar17 are the same or the alkylene carboxylate radical at least one of these the aryl groups is indicated to be by being different from each other and expressing the aryl group

which may be permuted by formula-(CH₂)_m-COOR (R and m express the same semantics as the above.) Ar14 and Ar15 express the same or the arylene radical which may be been [a radical / it] different from each other and permuted.

[Claim 5] A thoria reel amine system compound is a general formula (5). Electrophotography photo conductor according to claim 1 which is the compound shown.

[Formula 5]



(It permutes among the formula by that Ar18, Ar19, Ar22, and Ar23 are the same or the alkylene carboxylate radical at least one of these the aryl groups is indicated to be by being different from each other and expressing the aryl group which may be permuted by formula-(CH₂)_m-COOR (R and m express the same semantics as the above.) Ar20 and Ar21 express the same or the arylene radical which may be been [a radical / it] different from each other and permuted. X expresses an oxygen atom, a sulfur atom, -CH₂-, or -CH=CH-.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to an electrophotography photo conductor. Furthermore, it is related with the high sensitivity and the electrophotography photo conductor of high endurance containing a detailed specific thoria reel amine system compound.

[0002]

[Description of the Prior Art] In recent years, development of the copying machine using an electrophotography method and a printer is remarkable, various gestalten, a class, and the model of function are developed according to an application, and what also has the various photo conductor used for them corresponding to it is being developed. Conventionally, as an electrophotography photo conductor, the inorganic compound has mainly been used from the field of the sensibility and endurance. For example, a zinc oxide, a cadmium sulfide, a selenium, etc. can be mentioned. However, harmful matter is used in many cases, the abandonment poses a problem, and these become the cause of bringing about a public nuisance. Moreover, when sensibility uses a good selenium, it is necessary to form a thin film on a conductive base with vacuum deposition etc., productivity is inferior, and it becomes the cause of a cost rise. In recent years, an amorphous silicon attracts attention as a nonpolluting inorganic photo conductor, and the researches and developments are furthered. However, although these are also excellent about sensibility, in order to mainly use a plasma-CVD method at the time of thin film formation, the productivity is extremely inferior and photo conductor cost and a running cost are big.

[0003] On the other hand, an organic photo conductor can be incinerated and it has a pollution-free advantage, and thin film formation is possible for further many things by coating, and they are easy to mass-produce. So, cost can decrease sharply and it has the advantage in which various configurations are processible according to an application. However, in the organic photo conductor, the problem is left behind to the sensibility and endurance and an appearance of high sensitivity and the organic photo conductor of high endurance is desired strongly. Although various approaches as a means of the improvement in sensibility of an organic photo conductor are proposed, the functional discrete-type photo conductor of the two-layer structure is in use current to the Lord whom the function divided into the charge generating layer and the charge transportation layer. For example, the charge generated in the charge generating layer by exposure is injected into a charge transportation layer, it is conveyed [be / it / under / charge transportation layer / passing] to a front face, and an electrostatic latent image is formed in a photo conductor front face by neutralizing surface charge. A charge may be efficiently conveyed to a photo conductor front face, without possibility that the charge generated as compared with the monolayer mold will be captured becoming small, and each class having each function checked [discrete type / functional] (the 2803541st number of a U.S. patent). The luminous energy irradiated is absorbed as organic charge generating material used for a charge generating layer, and selection use of the compound which generates a charge efficiently is carried out, for example, an azo pigment (JP,54-14967,A), a non-metal phthalocyanine pigment (JP,60-19146,A), a metal phthalocyanine pigment (JP,57-146255,A), a square RIUMU salt (JP,63-113462,A), etc. can be mentioned. As charge transportation material used for a charge transportation layer, the injection efficiency of the charge from a charge generating layer is large, and it is necessary to select the compound whose mobility of the charge within a charge transportation layer is size further. For that purpose, a compound with small ionization potential and the compound which a cation radical tends to generate are chosen. For example, thoria reel amine derivative (JP,58-123542,A), hydrazone derivative (JP,57-101844,A), OKISA diazole derivative (JP,34-5466,B), pyrazoline derivative (JP,52-4188,B), stilbene derivative (JP,58-198043,A), triphenylmethane color derivative (JP,45-555,B), 1, and 3-butadiene derivative (JP,62-287257,A) etc. is proposed.

[0004]

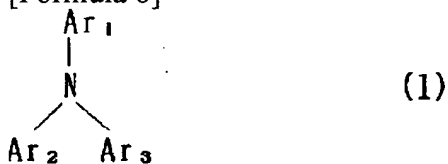
[Problem(s) to be Solved by the Invention] However, as compared with an inorganic photo conductor, it is unsatisfying [these organic photo conductor] still more in the point of sensibility and endurance like the above. Sensibility is governed by whenever [in a charge transportation layer / charge generating effectiveness / in a charge generating layer /, charge injection efficiency / from a charge generating layer to a charge transportation layer /, and charge transfer]. Then, development of charge generating material with high charge generating effectiveness and the large charge transportation material of whenever [charge transfer] is performed briskly. About injection efficiency, examination amelioration is hardly carried out the actual condition to it. Even if this injection efficiency is high in a high electric-field region, 50%, it is 10% or less and it is thought by making this injection efficiency high in a low electric-field region that it is possible. [of still much more high-sensitivity-izing] In order to pour in an electron hole from a charge generating layer efficiently to a charge transportation layer generally, it is necessary to make ionization potential of charge transportation material smaller than that of charge generating material, and to abolish an energy barrier. However, even when this condition is satisfied, injection efficiency is low in many cases. As the cause, one can consider that the partial microcrystal of the charge transportation material or binder used for a charge transportation layer becomes an obstruction. Moreover, the obstruction according [one] to the interface defect of a charge generating layer and a charge transportation layer is mentioned. The MORUHO logy-defect which produces these at the time of the desiccation after the adhesion of a charge generating layer and a charge transportation layer, adhesive badness, and coating, crystallization by the stimulus by the physical stimulus (contact to a toner, paper, and a cleaning blade) and the electric field at the time of use, etc. are considered as a cause.

[0005] The selection of charge transportation material and a binder crystallinity was more excellent in whose charge transportation material which was low excellent in compatibility, use and the adhesive property of a binder, and adhesion as an approach of solving these can be considered. However, there is almost no ingredient developed for such [until now] the purpose except for a special polycarbonate binder. Moreover, the same cause can be considered also in the problem of endurance. That is, when a certain obstruction exists in the interface of a charge generating layer and a charge transportation layer, space charge will be accumulated there and the rise of rest potential and destabilization of photo conductor surface potential will be caused. Moreover, by are recording of this space charge, degradation of charge transportation material is caused and continuous duty cannot be borne. It is thought that the same means as the above is effective as an approach of canceling this space charge. The purpose of this invention is in this very point, and is to offer high sensitivity and the electrophotography photo conductor of high endurance as what cancels this technical problem.

[0006]

[Means for Solving the Problem] Wholeheartedly, the thoria reel amine system compound which has a specific alkylene carboxylate radical as charge transportation material has low crystallinity as a result of research, and this invention persons are [that the above-mentioned technical problem should be solved] excellent in compatibility with a binder, and it came to complete a header and this invention for the charge transportation layer using this having a good adhesive property with a charge generating layer. That is, this invention is a general formula (1) in the sensitization layer prepared on the conductive base material. [0007]

[Formula 6]



[0008] Or are different from each other. the inside of a formula, Ar1 and Ar2, and Ar3 are the same -- the aryl group which may be permuted is expressed. the thoria reel amine frame shown -- one piece or two pieces or more -- having -- at least one [and] of these the aryl groups -- formula -(CH2) m-COOR (R expresses the alkyl group, aralkyl radical, or aryl group which may be permuted, and m expresses or more 1 six or less integer.) The electrophotography photo conductor characterized by including the thoria reel amine system compound permuted by the alkylene carboxylate radical shown is offered. As a thoria reel amine system compound used by this invention, it is following general formula (2) - (5). The compound shown is mentioned.

[0009]

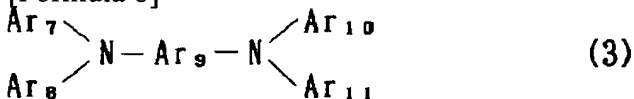
[Formula 7]



[0010] (It permutes among the formula by that Ar4, Ar5, and Ar6 are the same or the alkylene carboxylate radical at least one of these the aryl groups is indicated to be by being different from each other and expressing the aryl group which may be permuted by formula $-(CH_2)_m-COOR$ (R and m express the same semantics as the above.).)

[0011]

[Formula 8]



[0012] (It permutes among the formula by that Ar7, Ar8, Ar10, and Ar11 are the same or the alkylene carboxylate radical at least one of these the aryl groups is indicated to be by being different from each other and expressing the aryl group which may be permuted by formula $-(CH_2)_m-COOR$ (R and m express the same semantics as the above.).) Ar9 The arylene radical which may be permuted is expressed.

[0013]

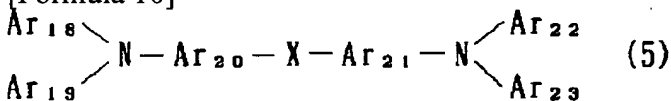
[Formula 9]



[0014] (It permutes among the formula by that Ar12, Ar13, Ar16, and Ar17 are the same or the alkylene carboxylate radical at least one of these the aryl groups is indicated to be by being different from each other and expressing the aryl group which may be permuted by formula $-(CH_2)_m-COOR$ (R and m express the same semantics as the above.).) Ar14 and Ar15 express the same or the arylene radical which may be been [a radical / it] different from each other and permuted.

[0015]

[Formula 10]



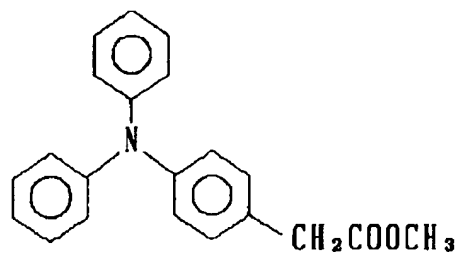
[0016] (It permutes among the formula by that Ar18, Ar19, Ar22, and Ar23 are the same or the alkylene carboxylate radical at least one of these the aryl groups is indicated to be by being different from each other and expressing the aryl group which may be permuted by formula $-(CH_2)_m-COOR$ (R and m express the same semantics as the above.).) Ar20 and Ar21 express the same or the arylene radical which may be been [a radical / it] different from each other and permuted. X expresses an oxygen atom, a sulfur atom, $-CH_2-$, or $-CH=CH-$. Said general formula (1) - (5) It sets. Or are different from each other. Ar1, Ar2, Ar3, Ar4, Ar5, Ar6, Ar7, Ar8 and Ar10, Ar11, Ar12, Ar13, Ar16, Ar17, Ar18, Ar19, Ar22, and Ar23 are the same -- Although the aryl group which may be permuted is shown, radicals, such as phenyl, naphthyl, and anthranil, are illustrated as an aryl group, and they are a phenyl group and a naphthyl group preferably. Although the aryl group may be permuted, as a substituent, an alkyl group, an alkoxy group, etc. are mentioned and a methyl group, an ethyl group, a methoxy group, and an ethoxy radical are usually desirable. Moreover, although at least one aryl group in a monad is permuted by the alkylene carboxylate radical shown by formula $-(CH_2)_m-COOR$ (R and m express the same semantics as the above.), one aryl group in a monad is preferably permuted by the above-mentioned alkylene carboxylate radical. R Although the alkyl group, aralkyl radical, or aryl group which may be ***** (ed) is shown As an alkyl group, the straight chain of carbon numbers 1-8 or the alkyl group of branching is desirable. Radicals, such as methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, t-butyl, n-pentyl, n-hexyl, n-heptyl, and n-octyl, are specifically mentioned, and they are methyl, ethyl, n-propyl, isopropyl, and n-butyl preferably. Although this alkyl group may be permuted, as a substituent, an alkoxy group is mentioned and it is usually a methoxy group and an ethoxy radical preferably. R When it is a ** aralkyl radical, radicals, such as phenyl by which the aryl group part was permuted by no permuting or the alkyl group, the alkoxy group, etc., naphthyl, and anthranil, are mentioned, the thing of carbon numbers 1-4 is mentioned as an alkylene part, and it is methylene preferably. Specifically, radicals, such as benzyl, p-methylbenzyl, and m-methylbenzyl, are mentioned. R When it is a ** aryl group, radicals, such as phenyl permuted by no permuting or the alkyl group, the alkoxy group, etc., naphthyl, and anthranil, are mentioned, and it is a phenyl group preferably. m Although it is an integer not more than more than ** 16, it is 1 preferably. Ar9, Ar14, Ar15, Ar20, and Ar21 Although the same or the arylene radical which may be been [a radical / it] different from each other

and permuted is shown, as an arylene radical, a phenylene group, a naphthylene radical, an ANSURANIREN radical, etc. are illustrated, and they are a phenylene group and a naphthylene radical preferably. As a substituent, an alkyl group, an alkoxy group, etc. are mentioned and a methyl group, an ethyl group, a methoxy group, and an ethoxy radical are usually desirable.

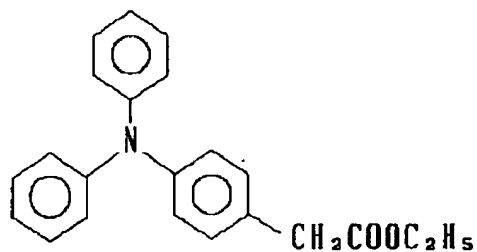
[0017] The thoria reel amine system compound used by this invention is compoundable by the well-known approach. For example, you Grignard-ize a halogeno MECHIRUTORI arylamine system compound first, you make it react with a carbon dioxide, and it considers as a methylene carboxylic-acid (acetic acid) derivative. Then, what is necessary is to make it react with corresponding alcohol and just to esterify. The thoria reel amine system compound in connection with this invention obtained as mentioned above has low crystallinity, and the compatibility with a solvent and a binder is very excellent. Furthermore, $-(CH_2)_m-COOR$ As compared with the thoria reel amine system compound which is not permuted, whenever [charge transfer] is almost unchanging, and large. Therefore, high sensitivity and the electrophotography photo conductor of high endurance are given. Although the thoria reel amine system compound used for this invention is illustrated concretely hereafter (compound (6) - (233)), this invention is not limited to these.

[0018]

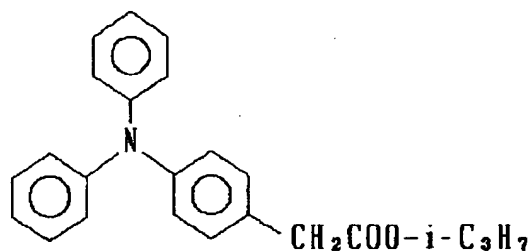
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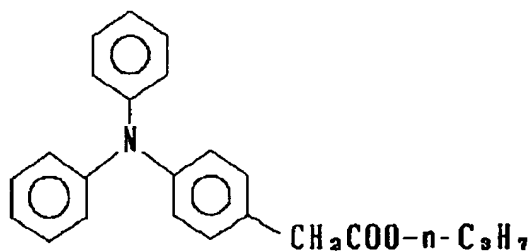
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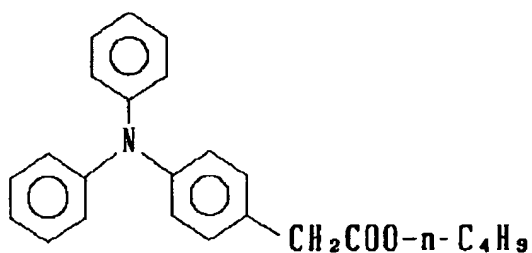
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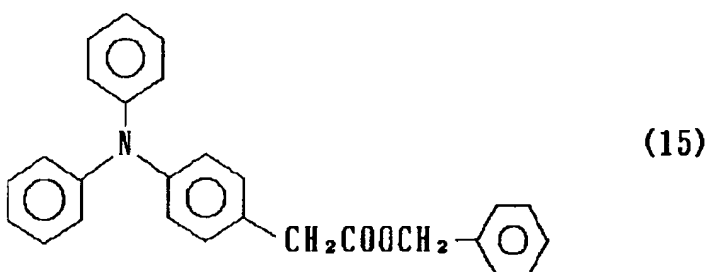
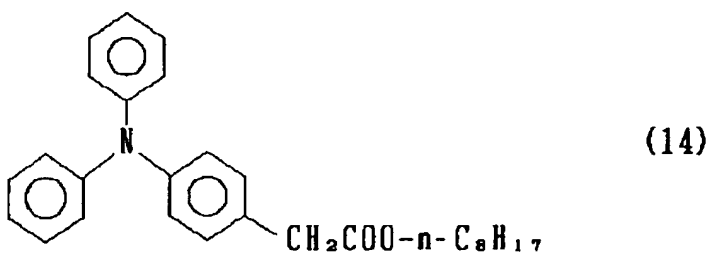
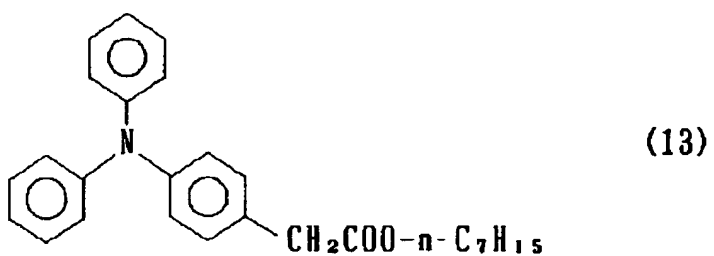
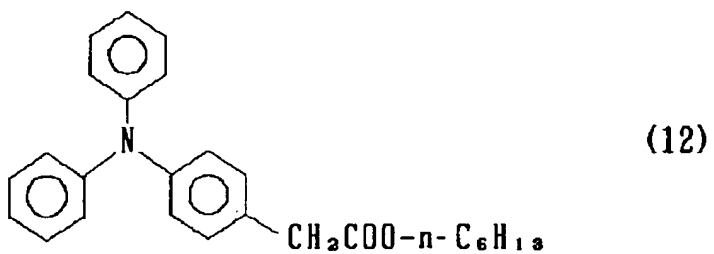
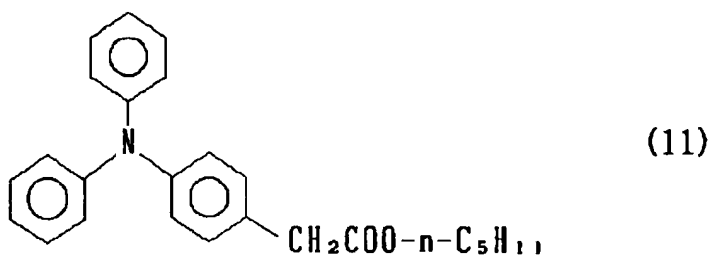


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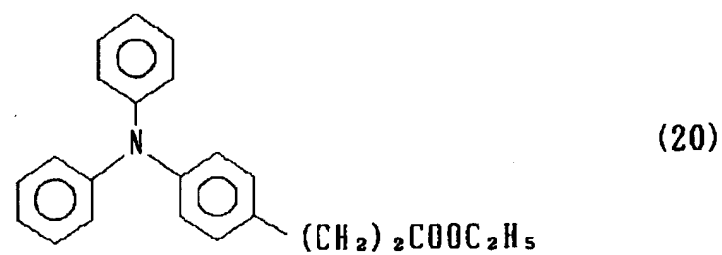
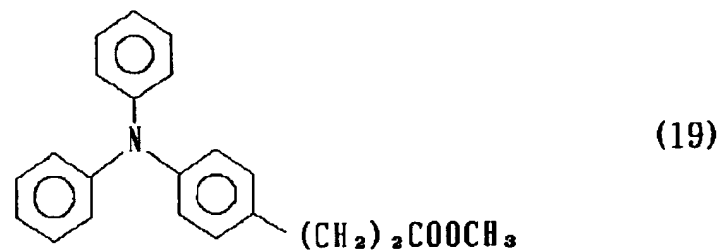
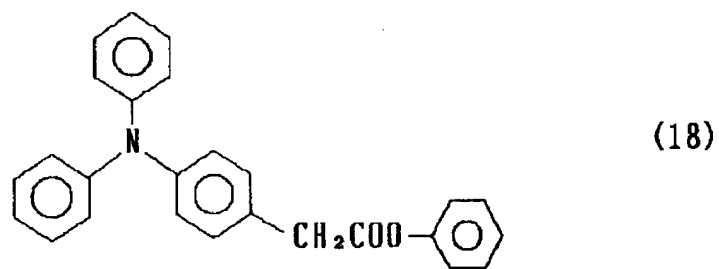
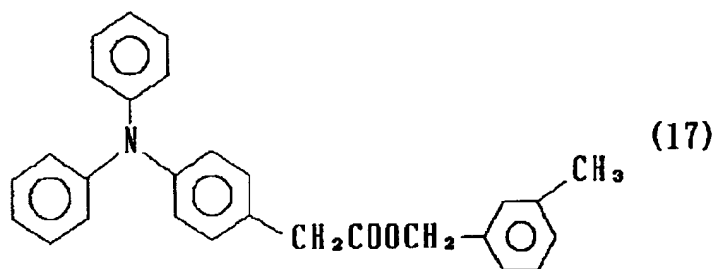
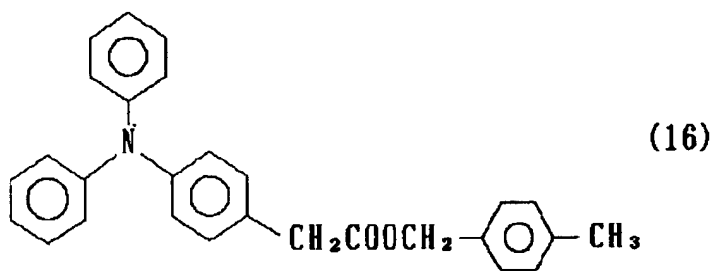


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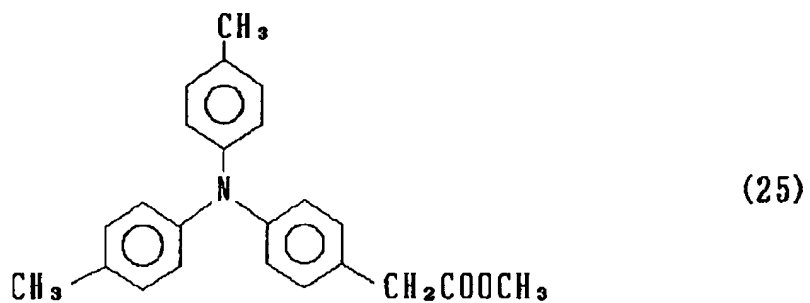
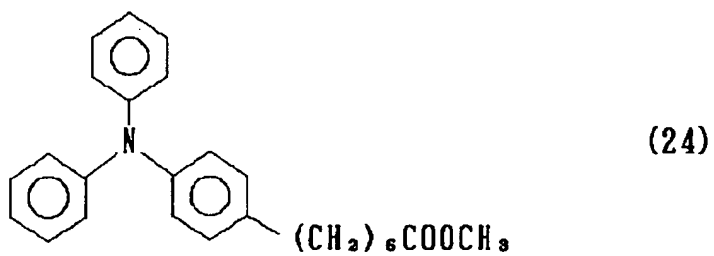
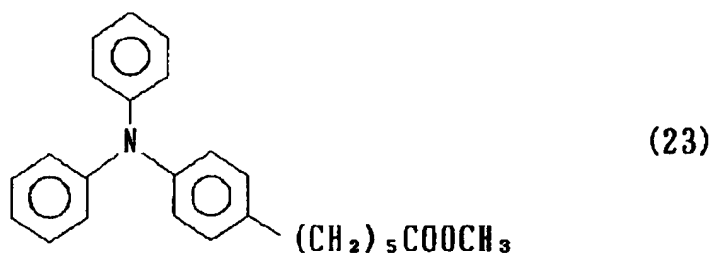
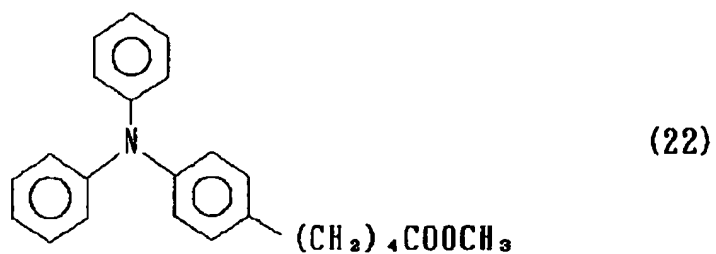
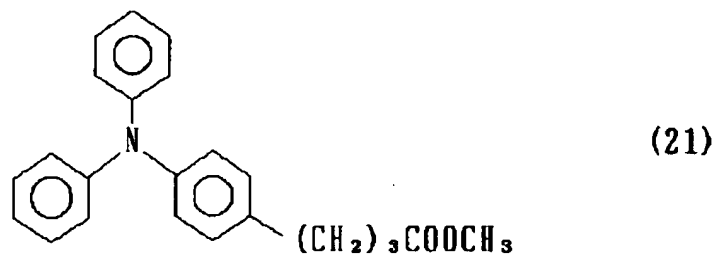
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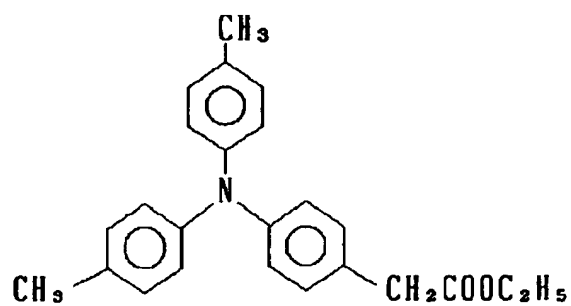
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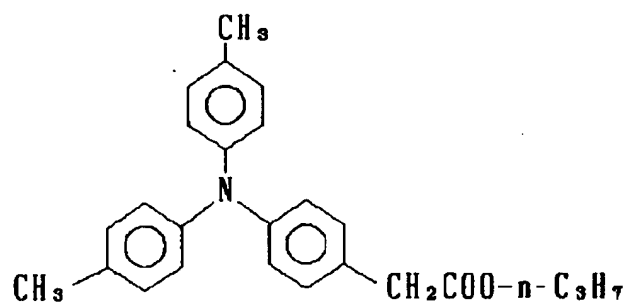
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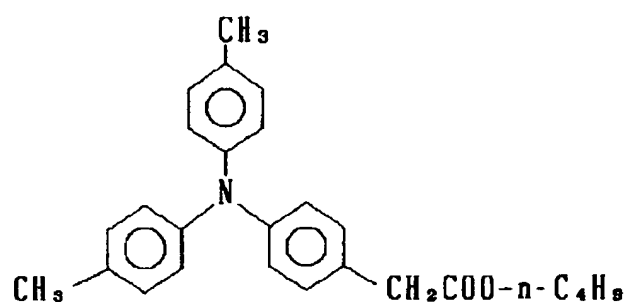
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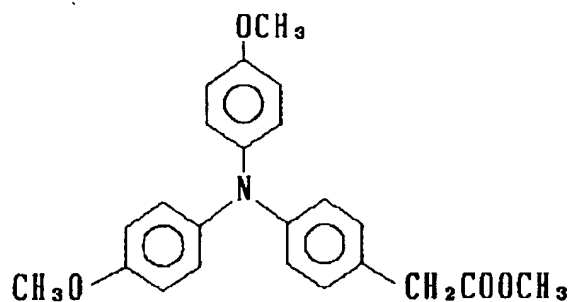
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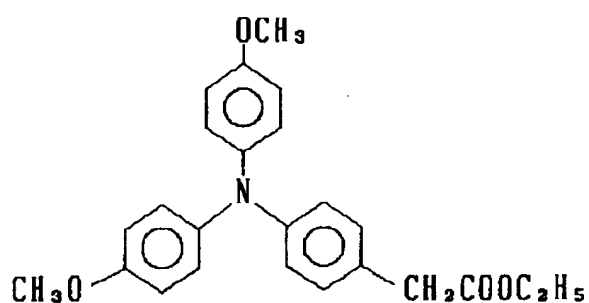
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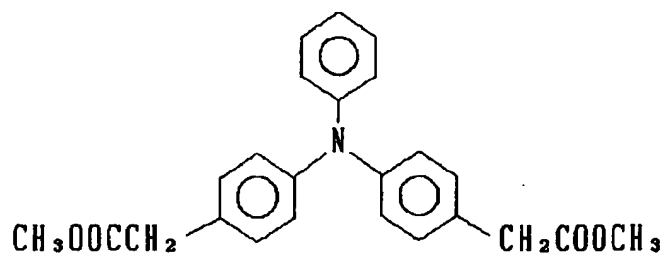


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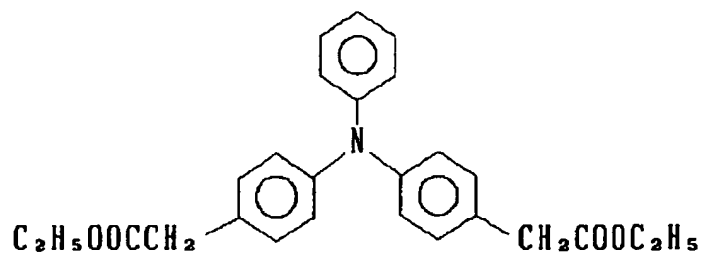


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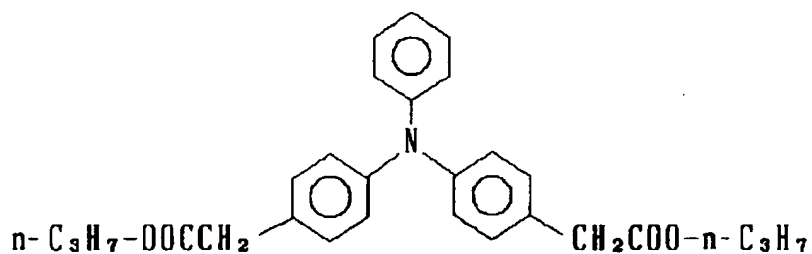
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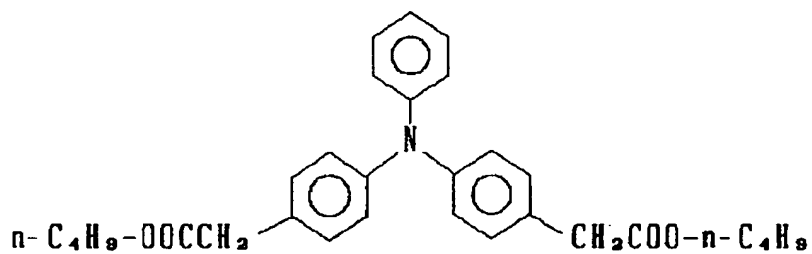
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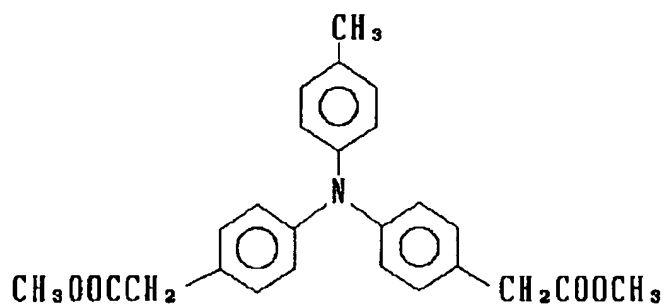
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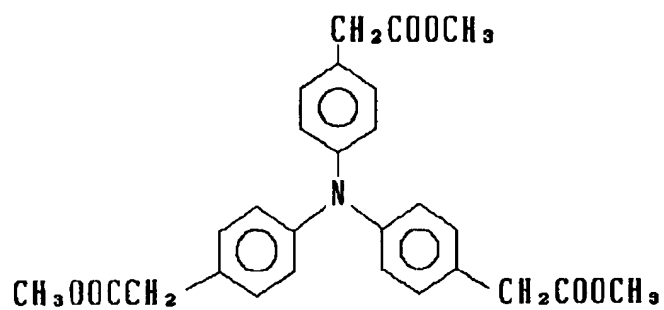


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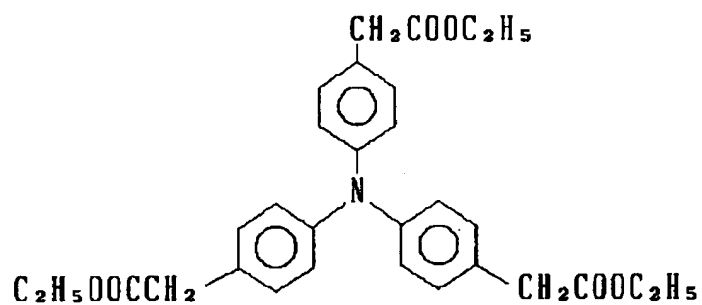


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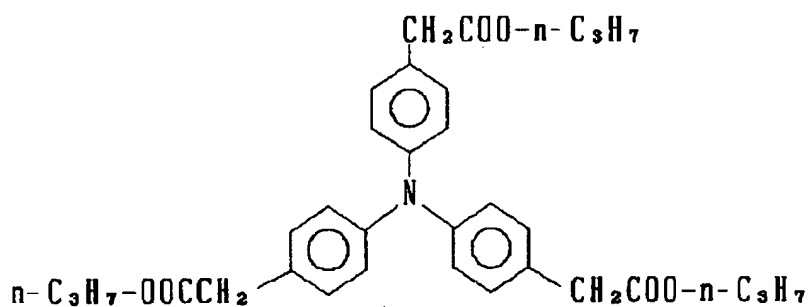
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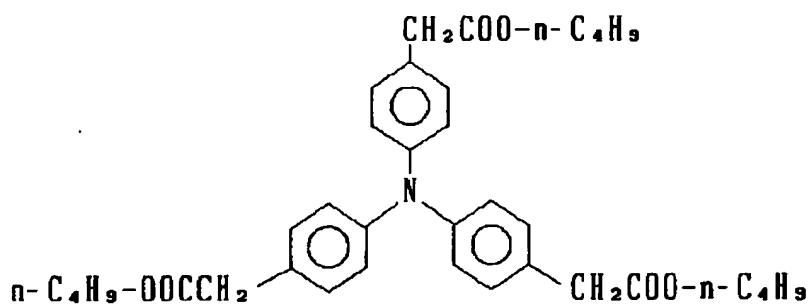
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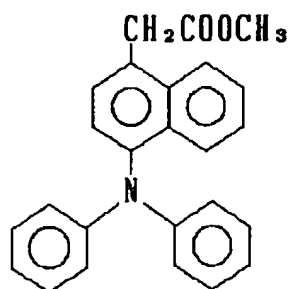
(37)



(38)

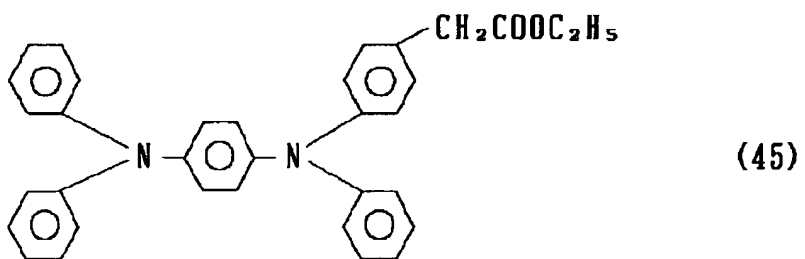
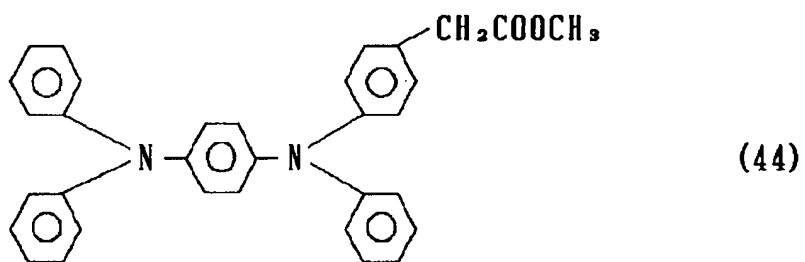
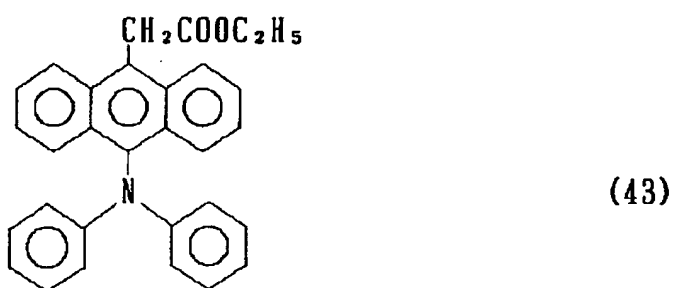
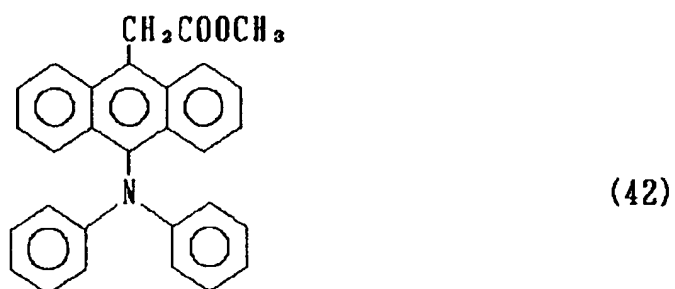
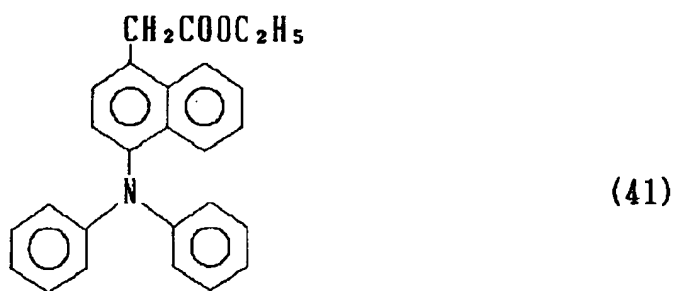


(39)

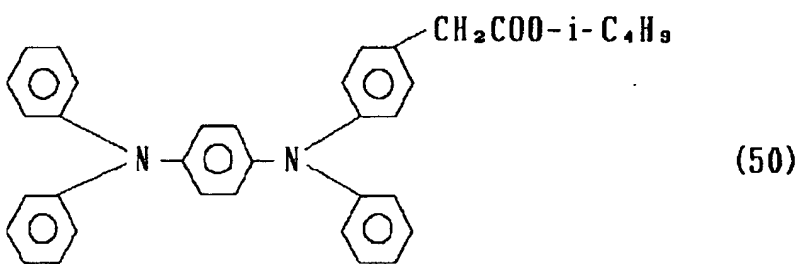
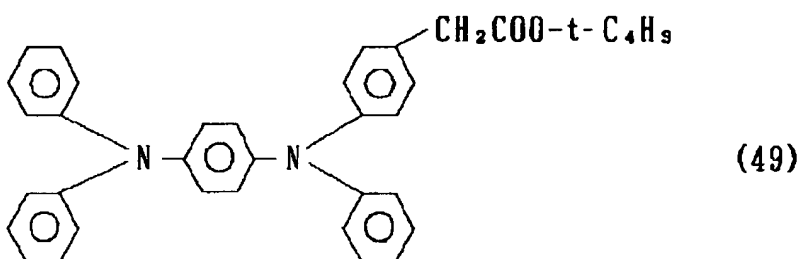
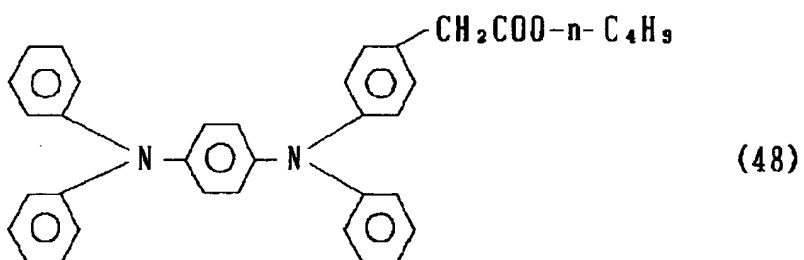
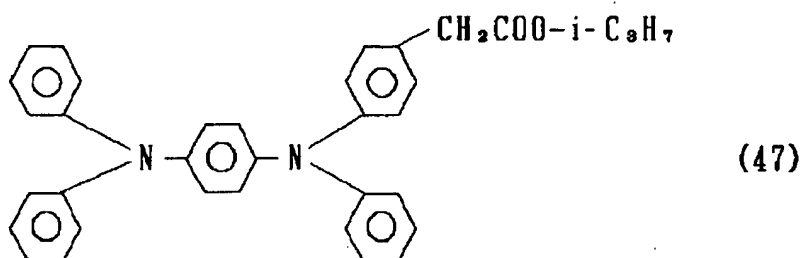
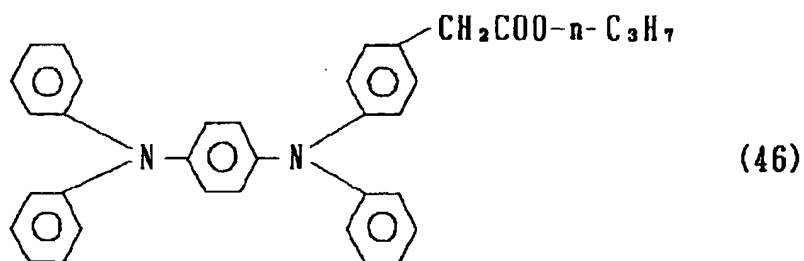


(40)

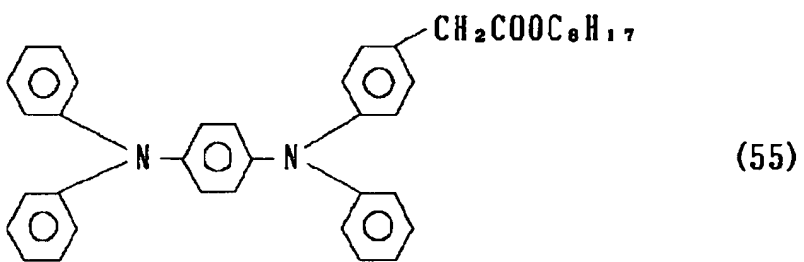
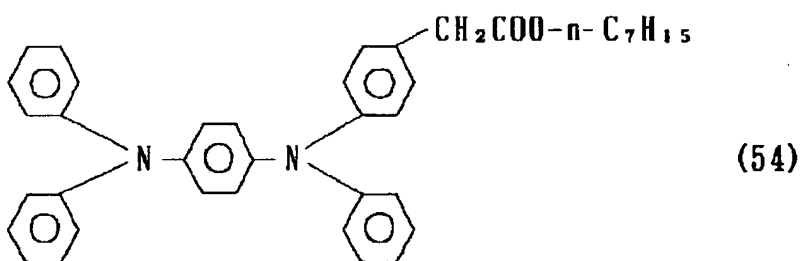
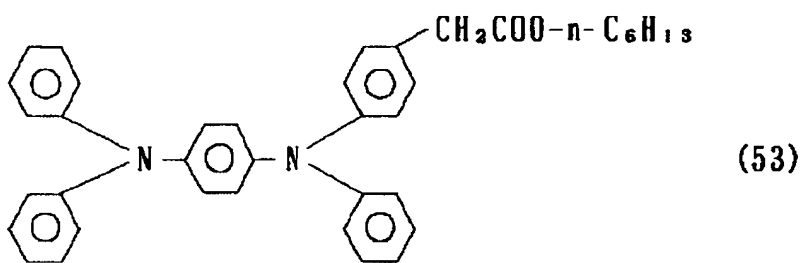
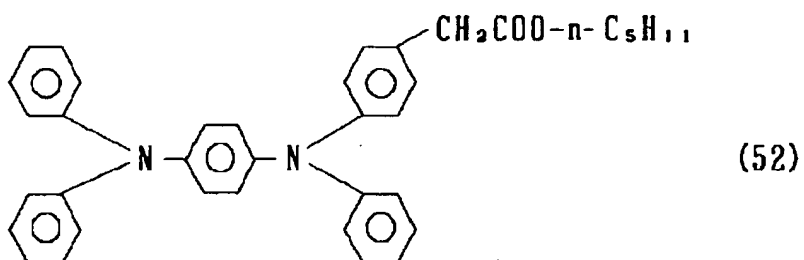
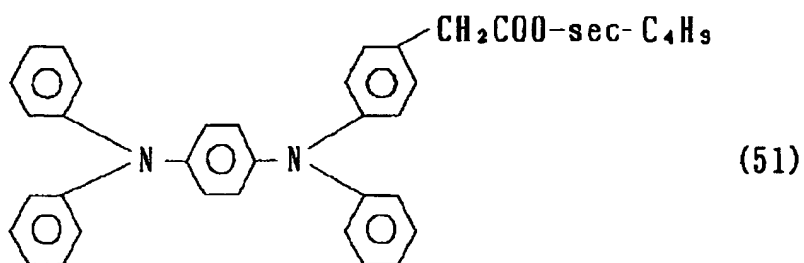
[0025]
[Formula 18]



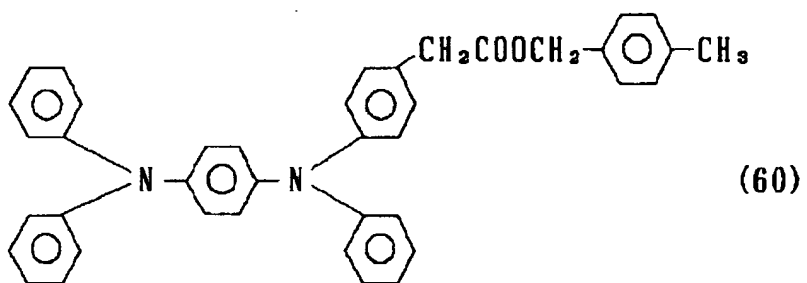
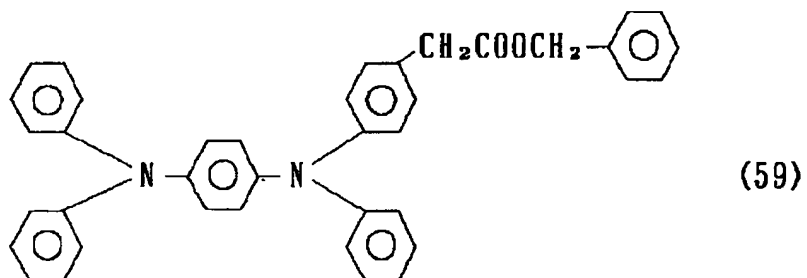
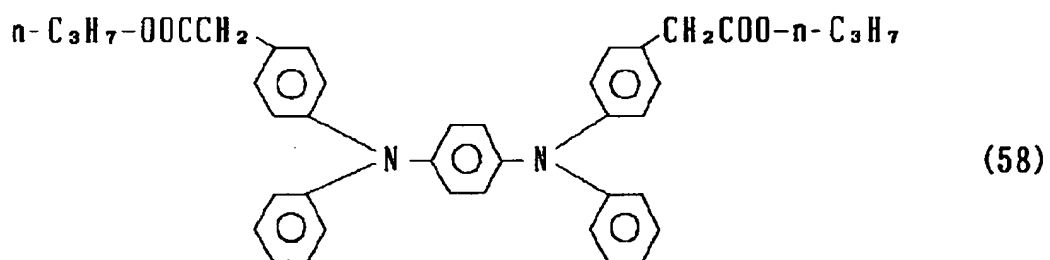
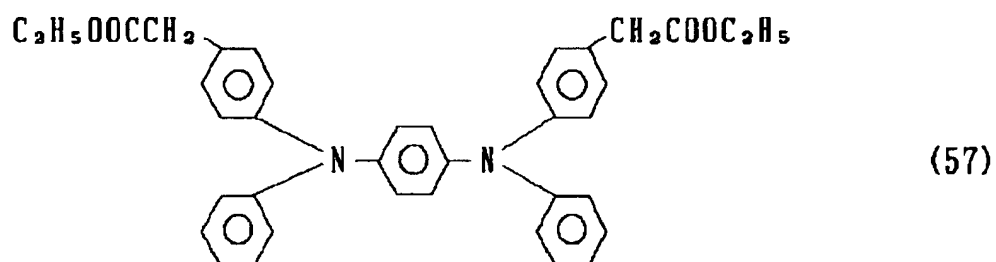
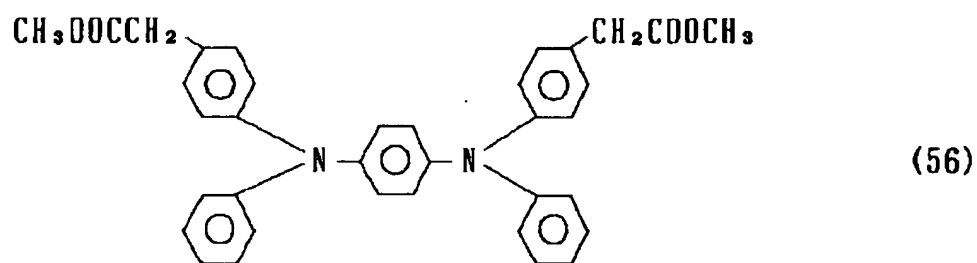
[0026]
[Formula 19]



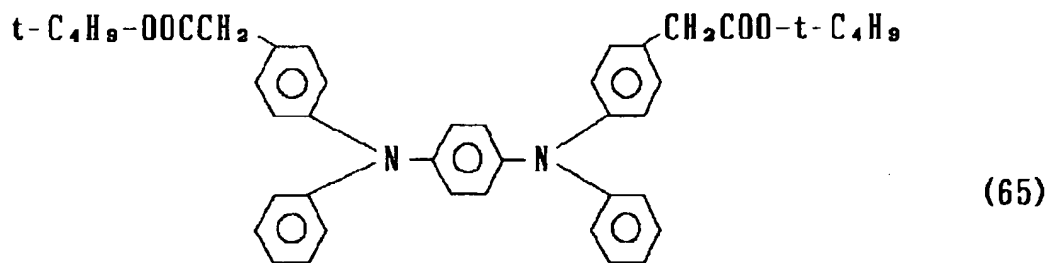
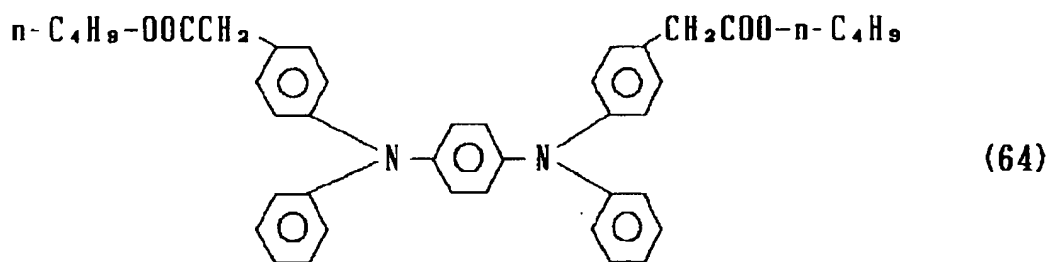
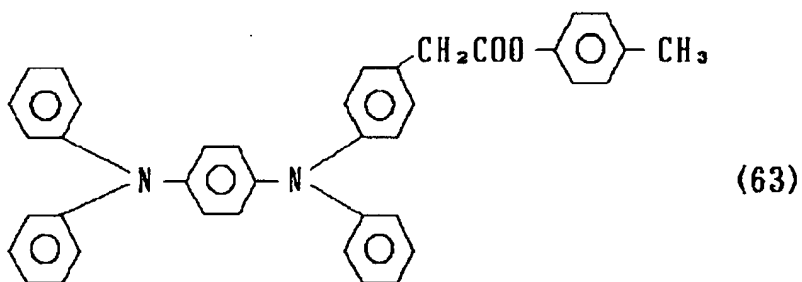
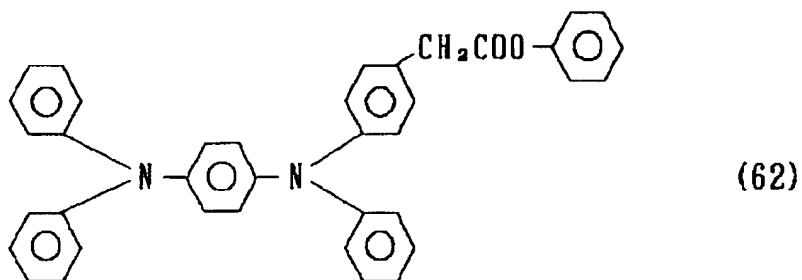
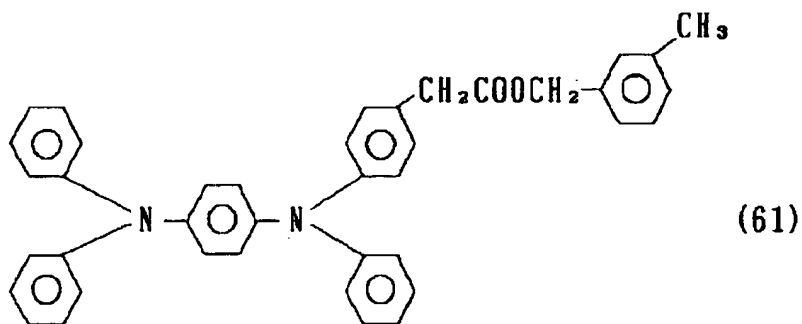
[0027]
[Formula 20]



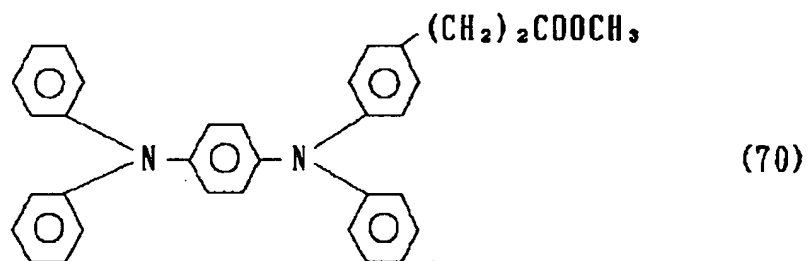
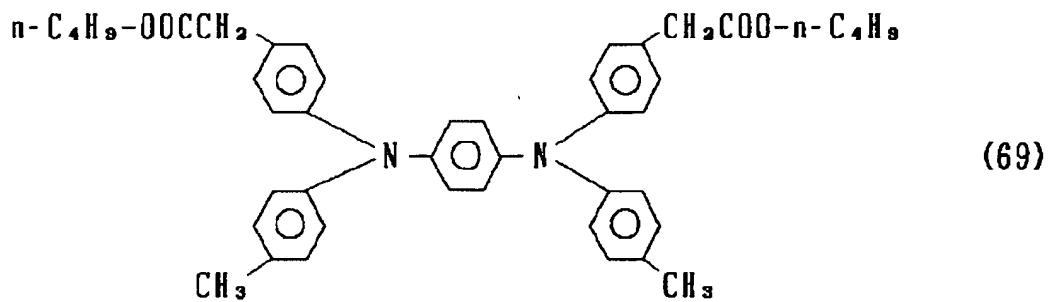
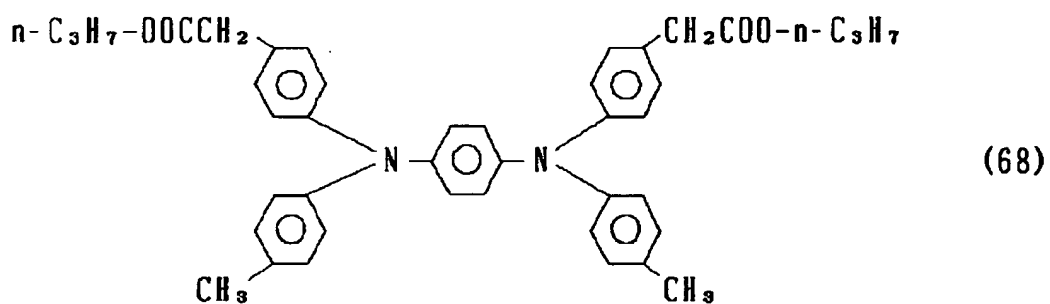
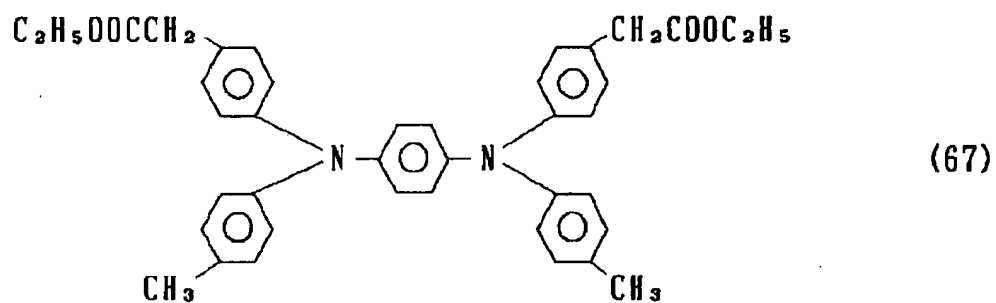
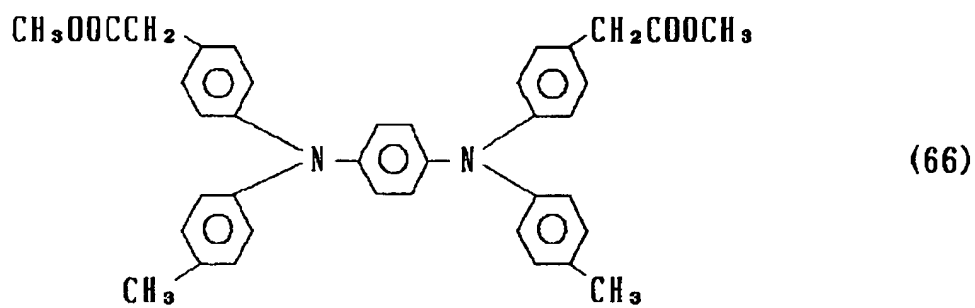
[0028]
[Formula 21]



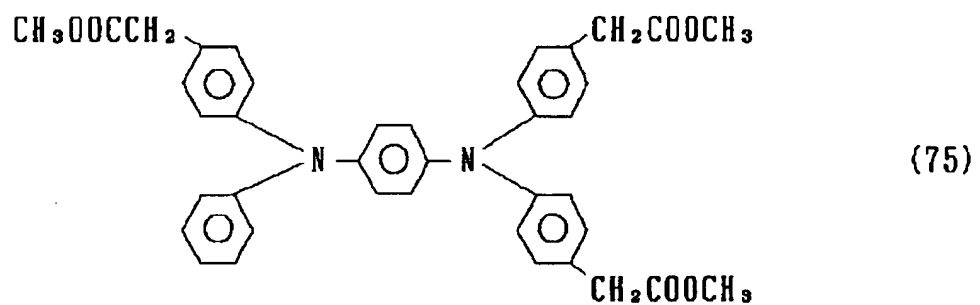
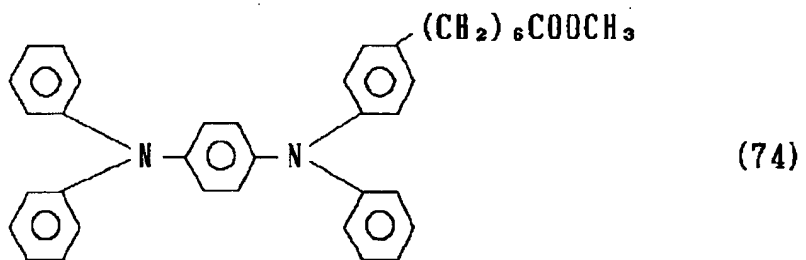
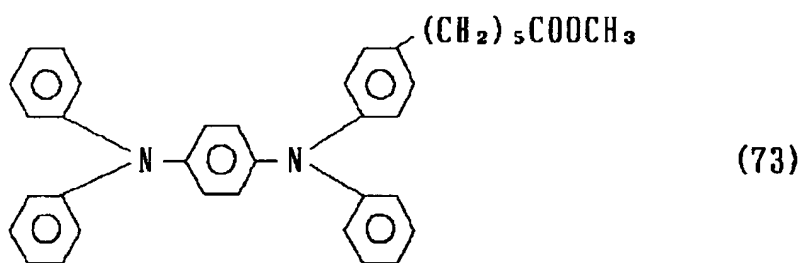
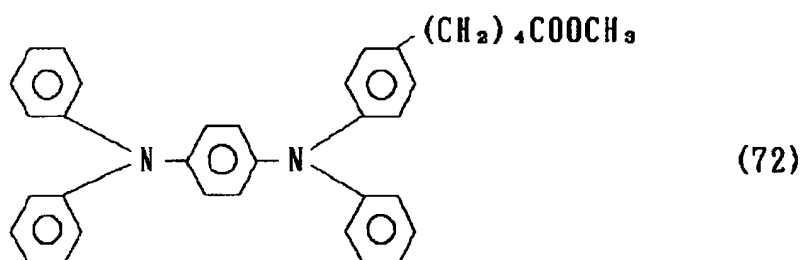
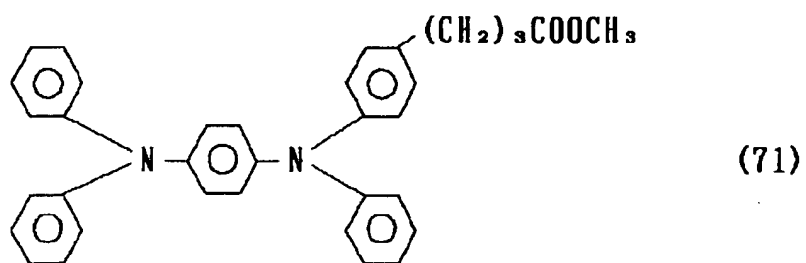
[0029]
[Formula 22]



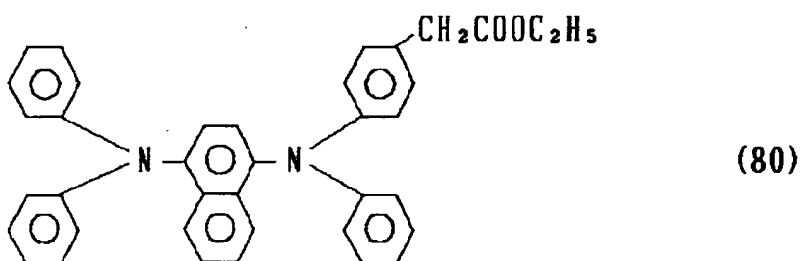
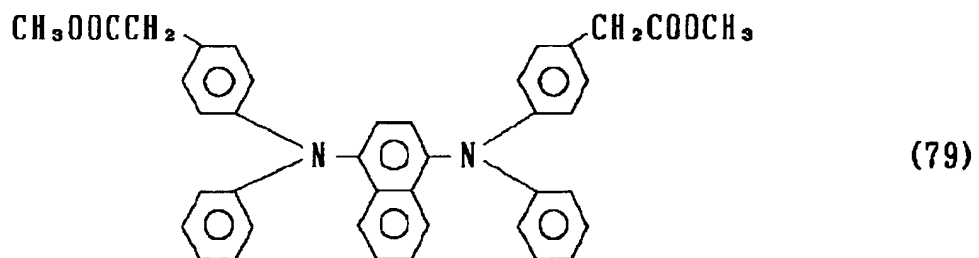
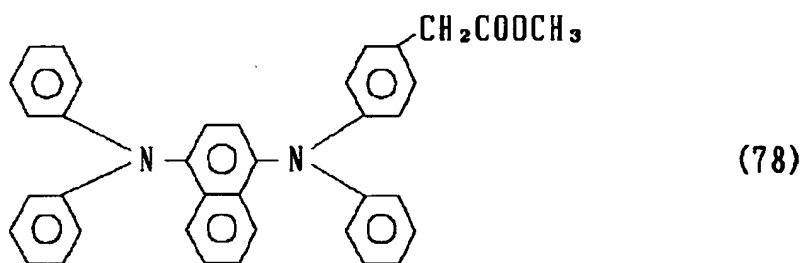
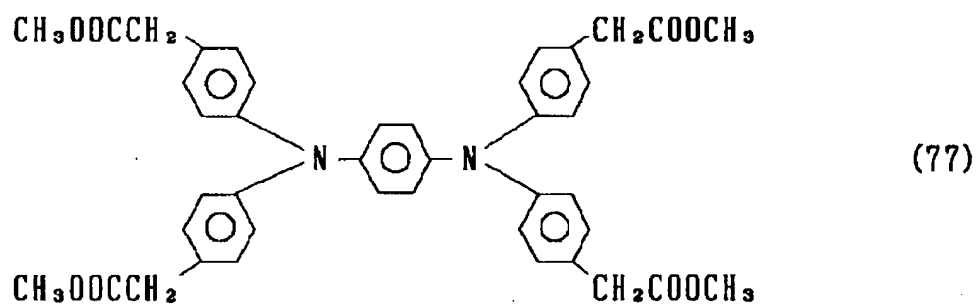
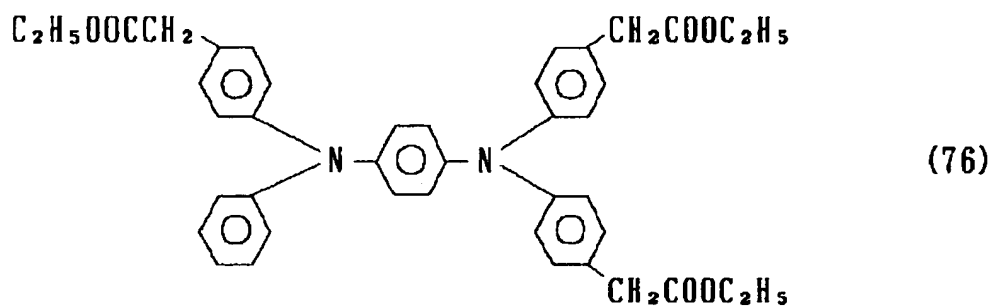
[0030]
[Formula 23]



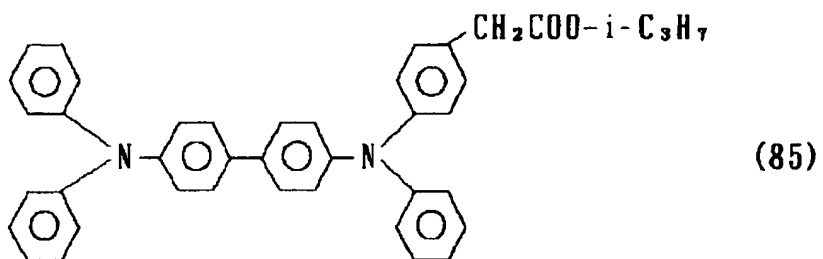
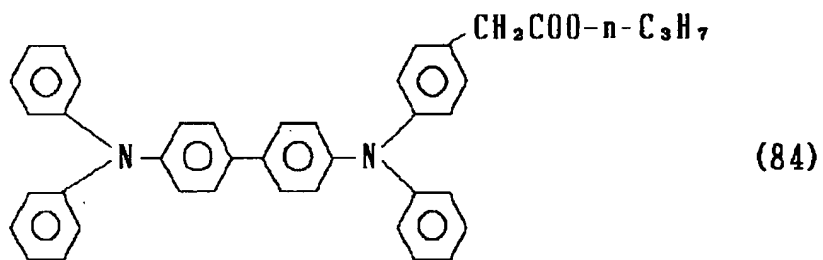
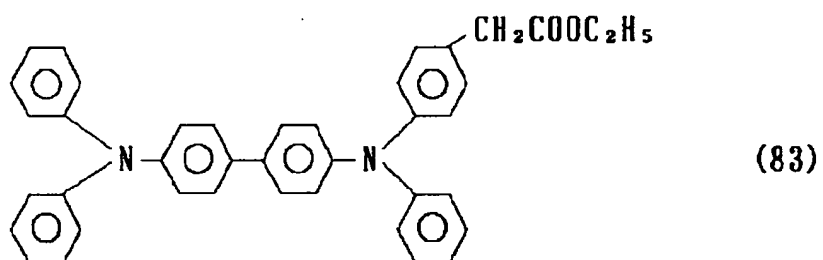
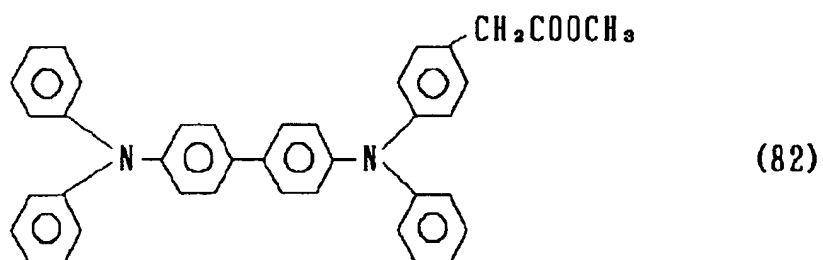
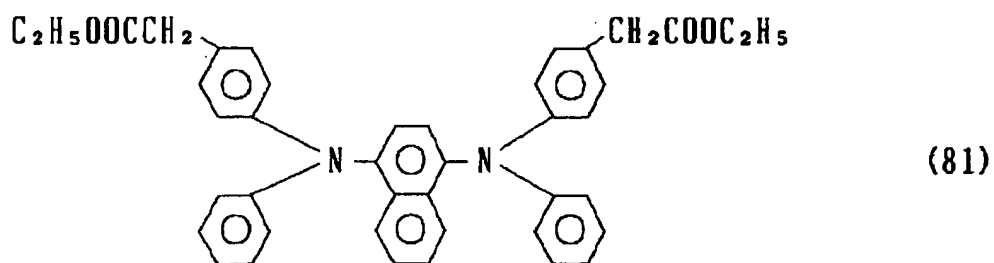
[0031]
[Formula 24]



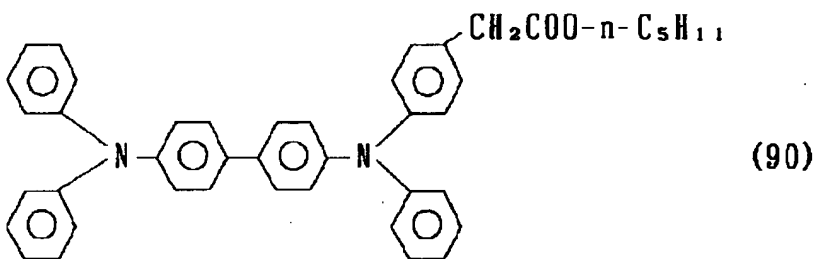
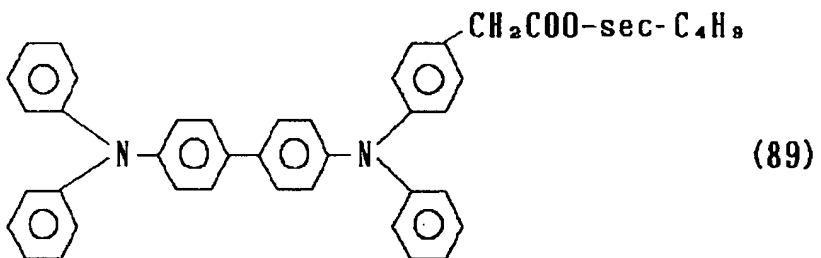
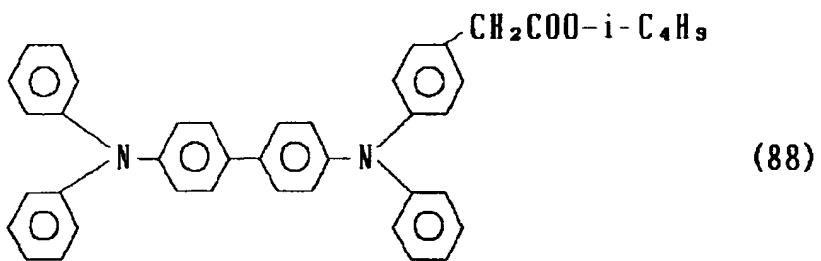
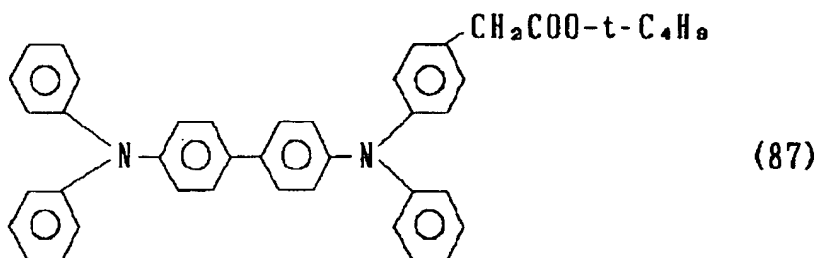
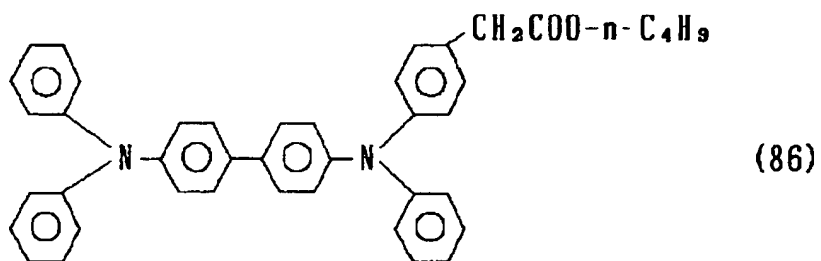
[0032]
[Formula 25]



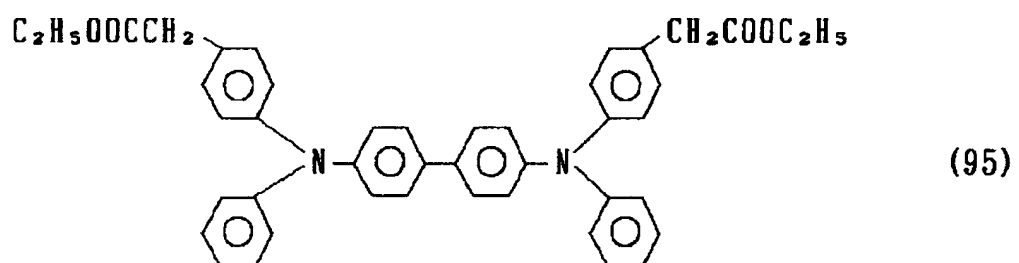
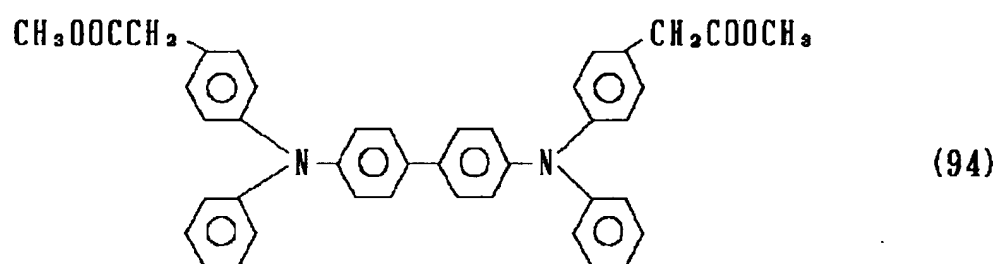
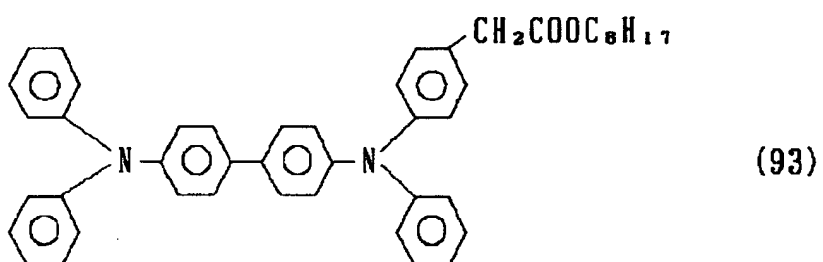
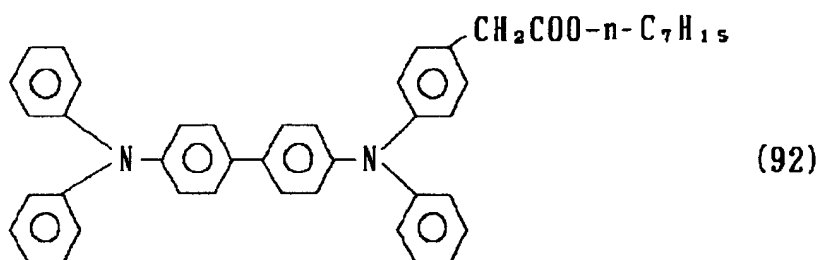
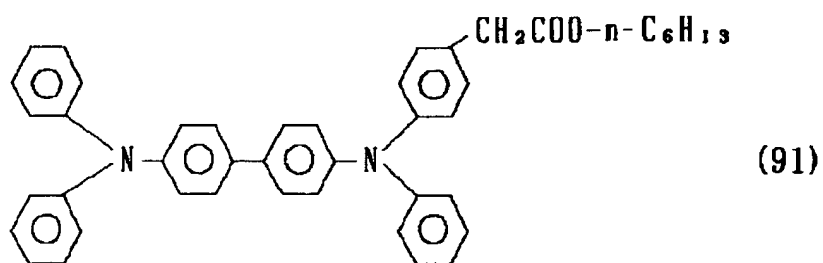
[0033]
[Formula 26]



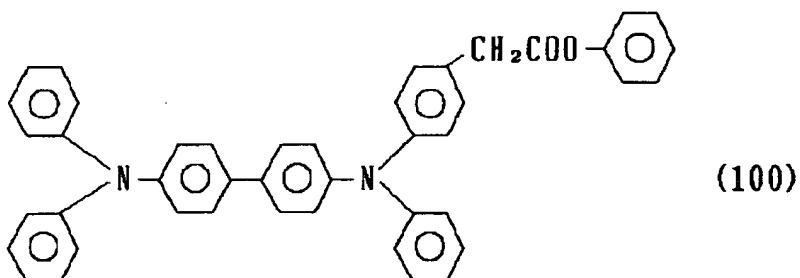
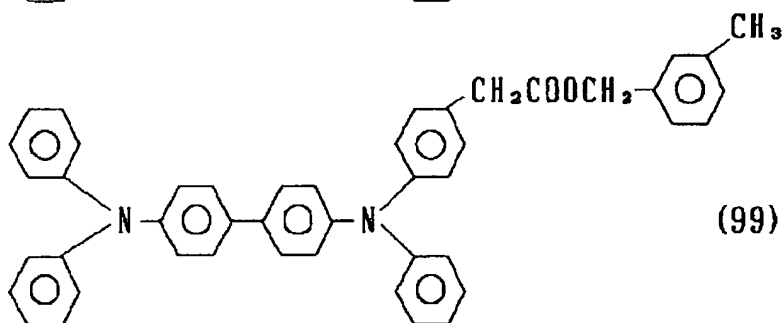
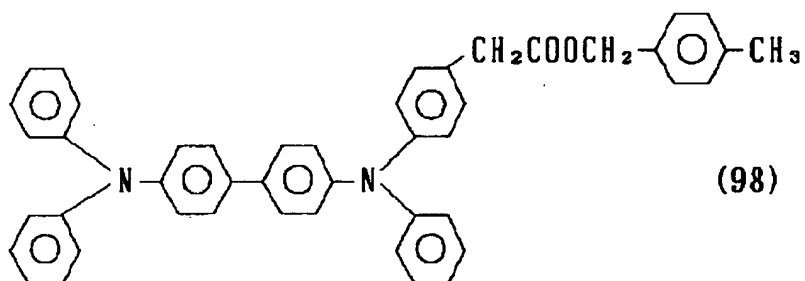
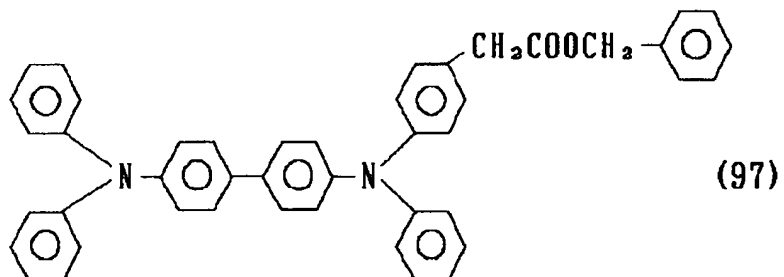
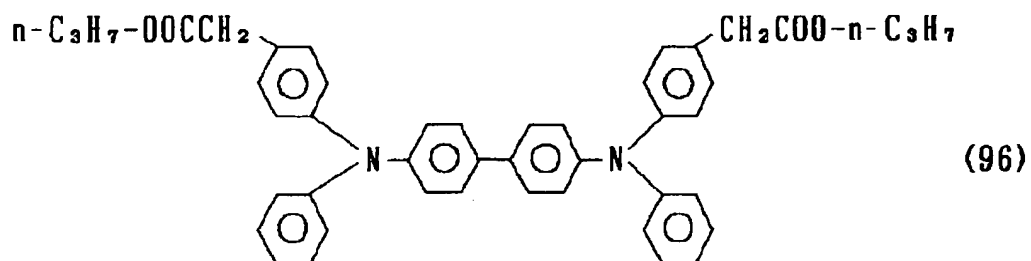
[0034]
[Formula 27]



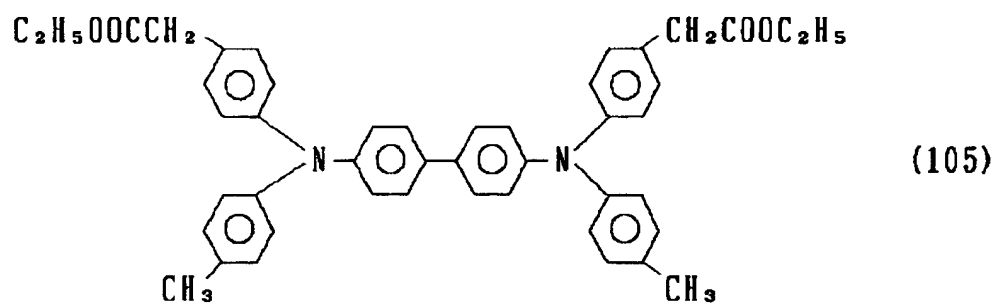
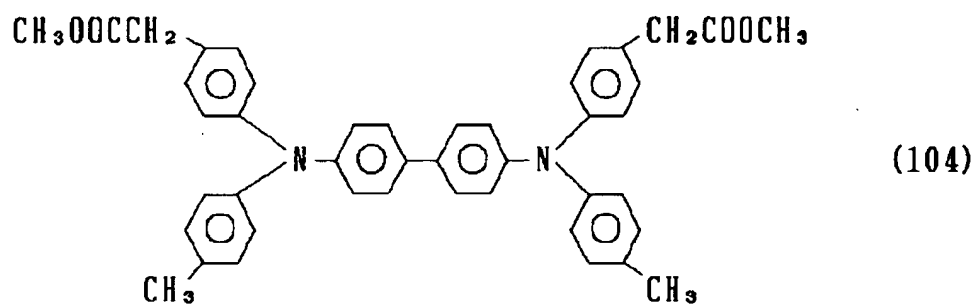
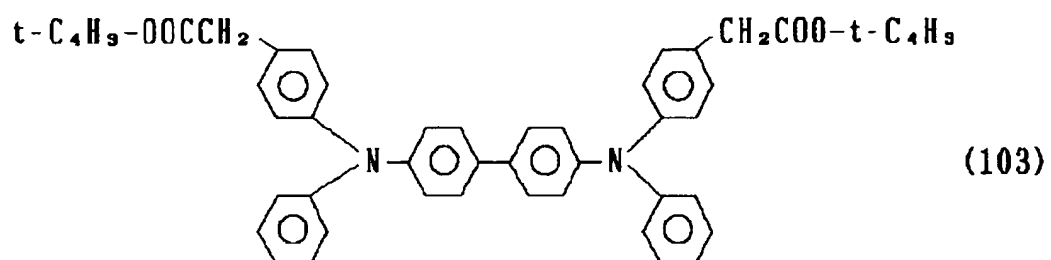
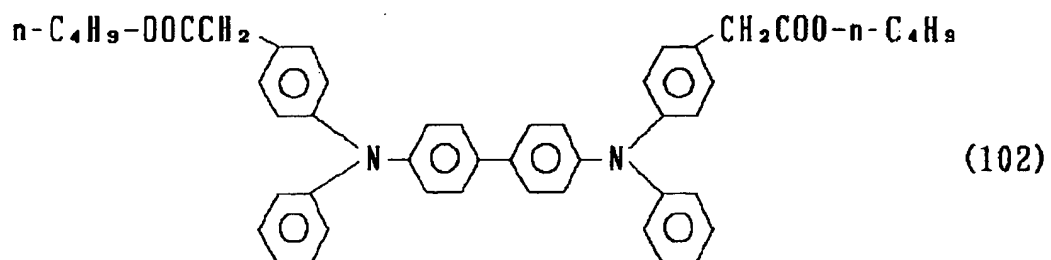
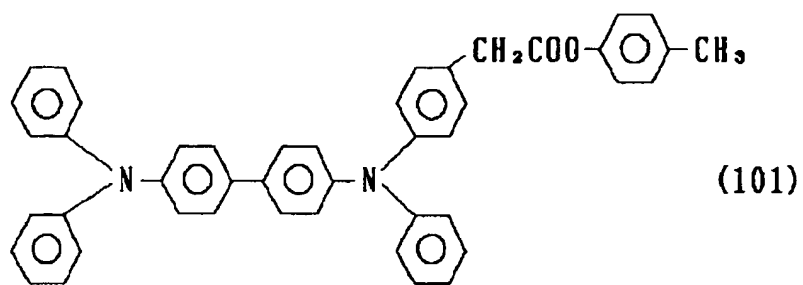
[0035]
[Formula 28]



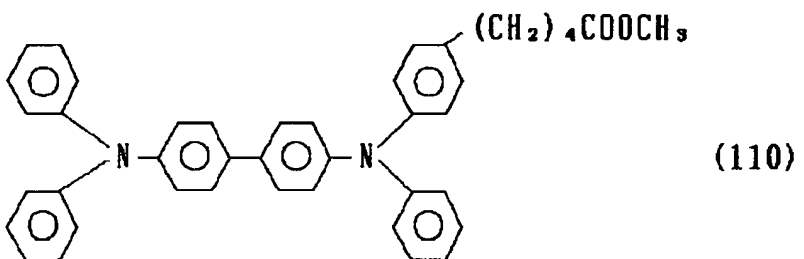
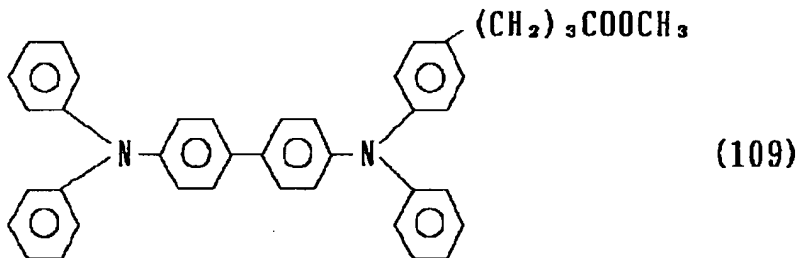
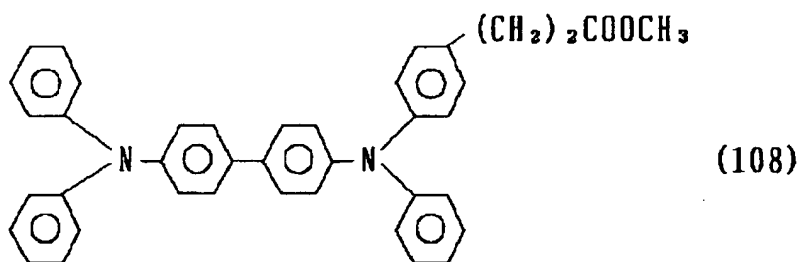
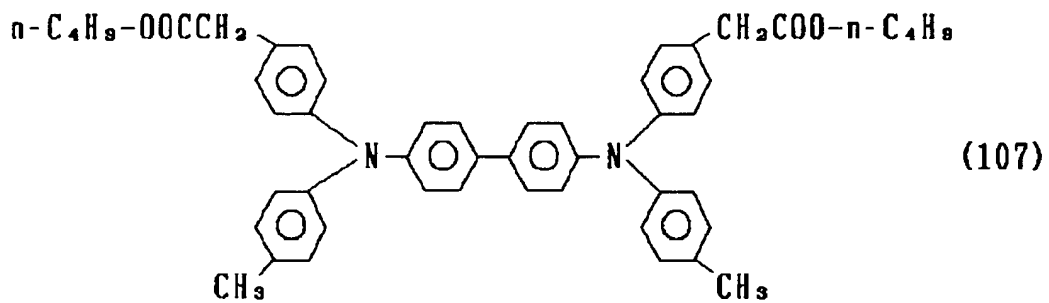
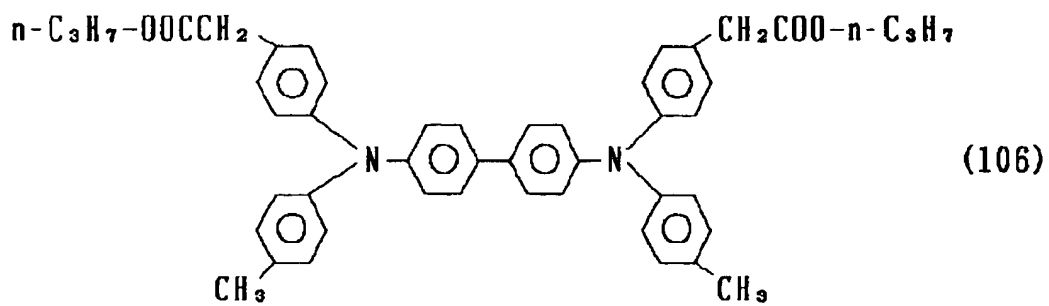
[0036]
[Formula 29]



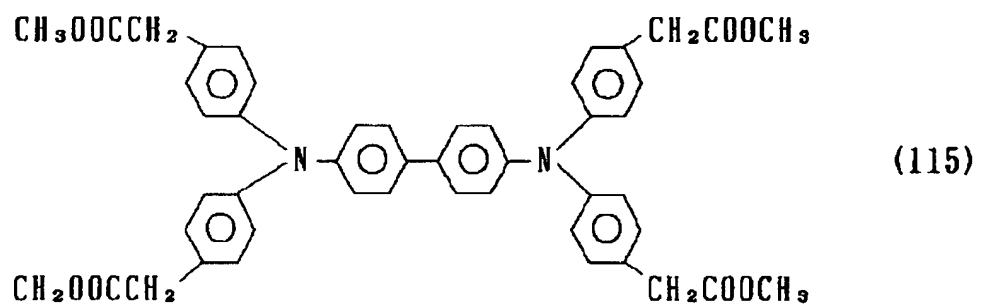
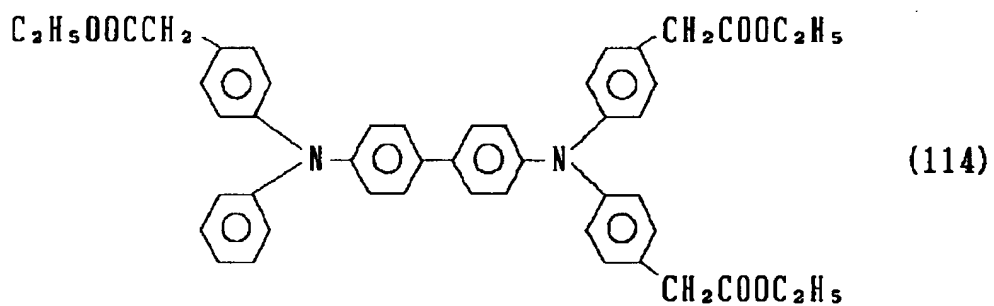
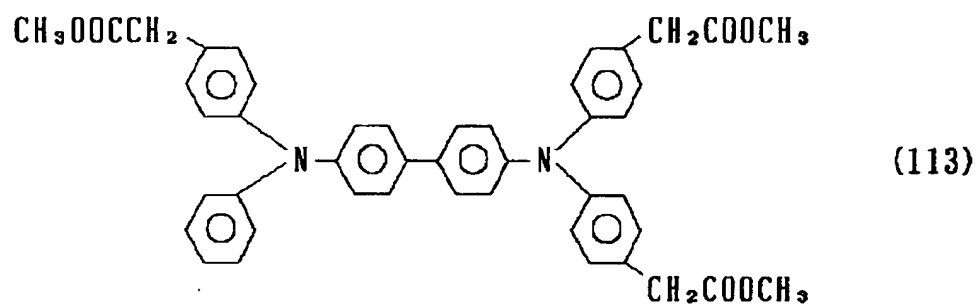
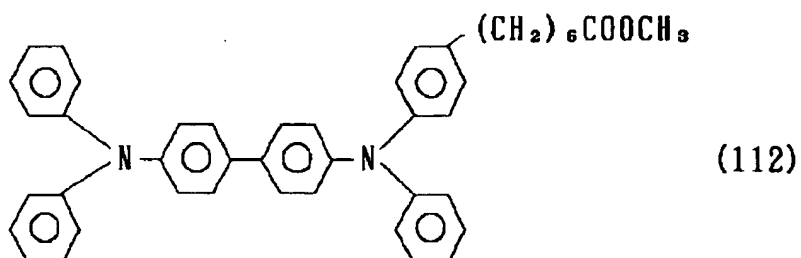
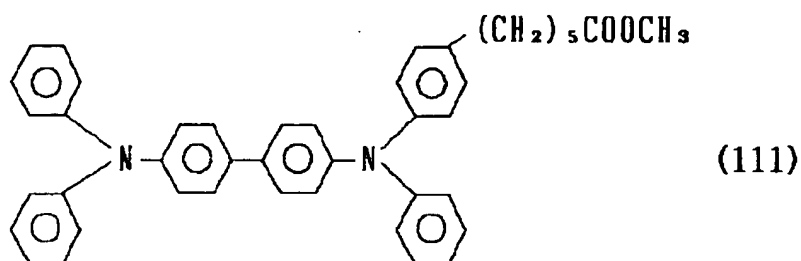
[0037]
[Formula 30]



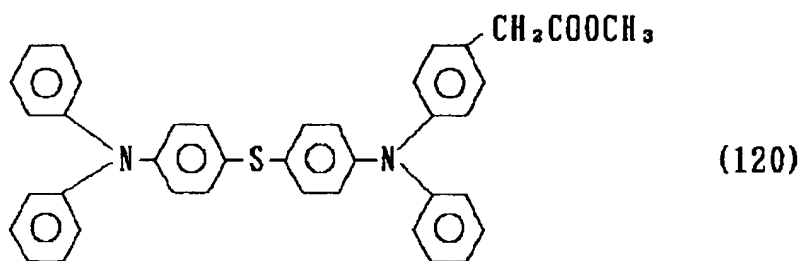
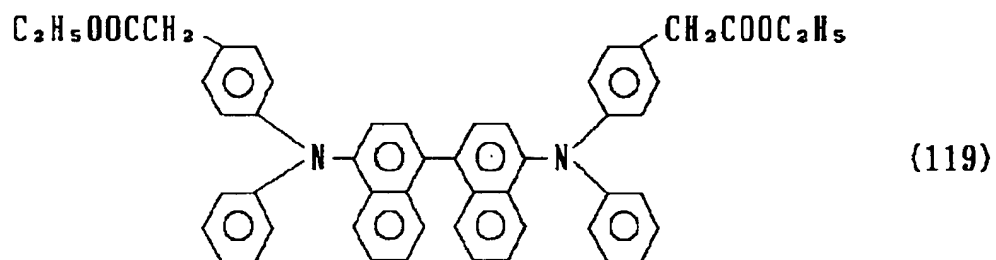
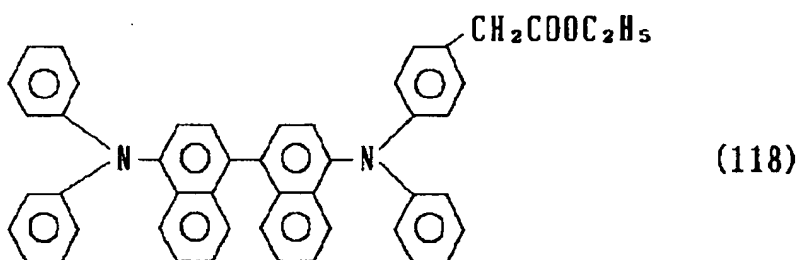
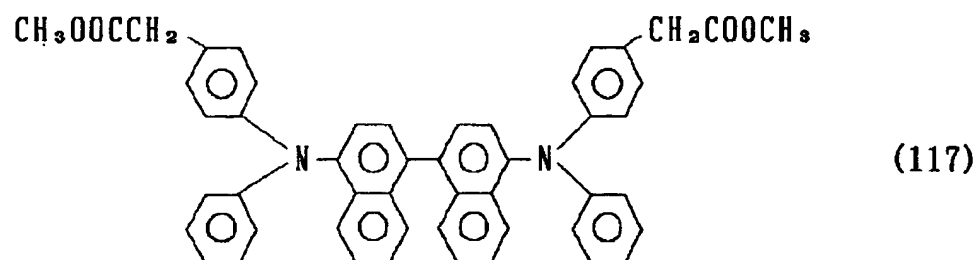
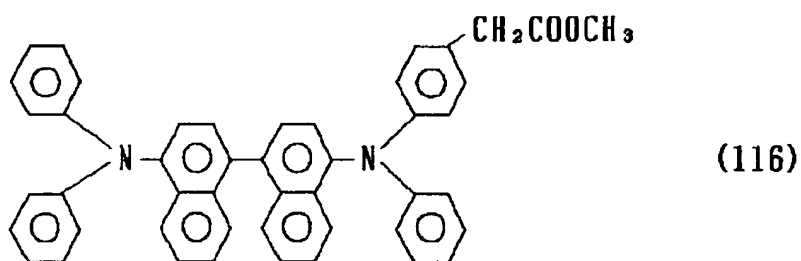
[0038]
[Formula 31]



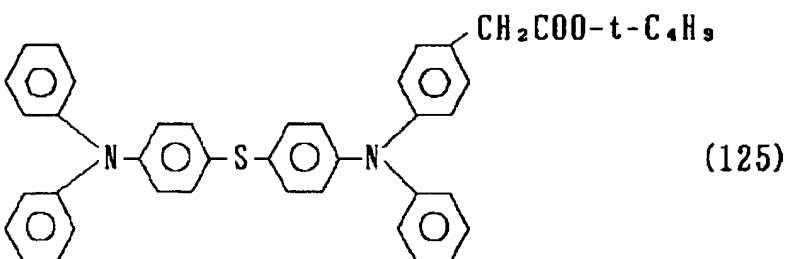
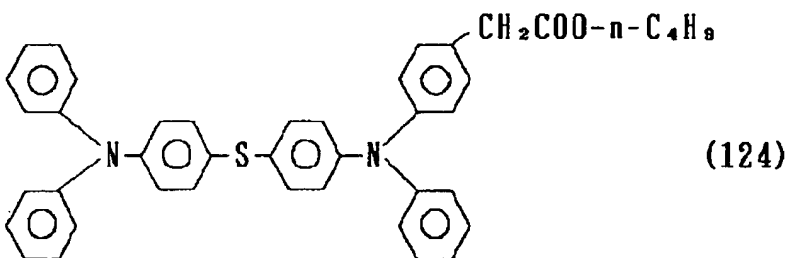
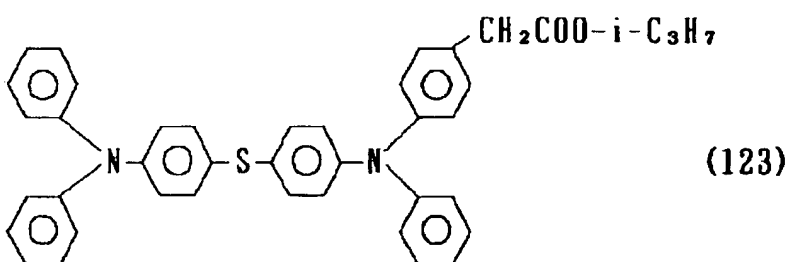
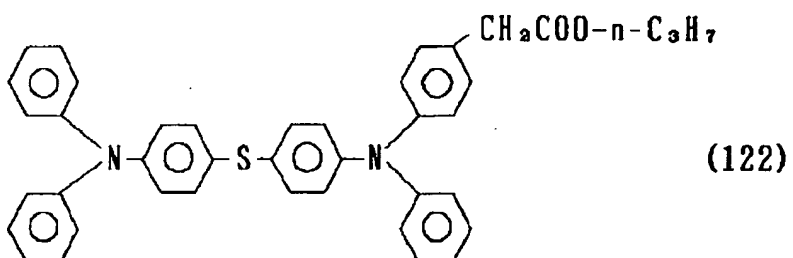
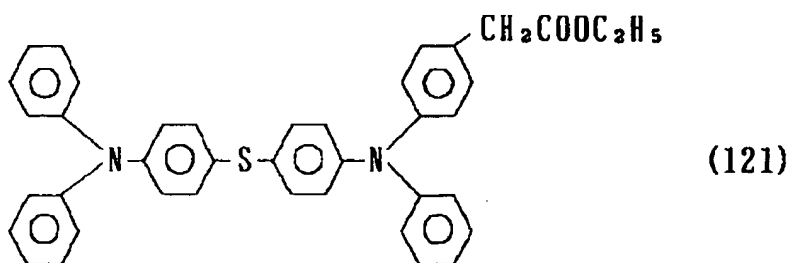
[0039]
[Formula 32]



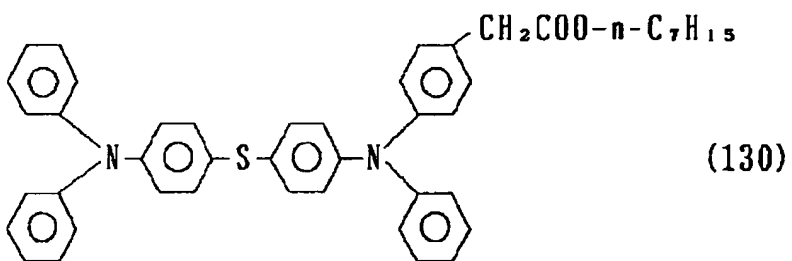
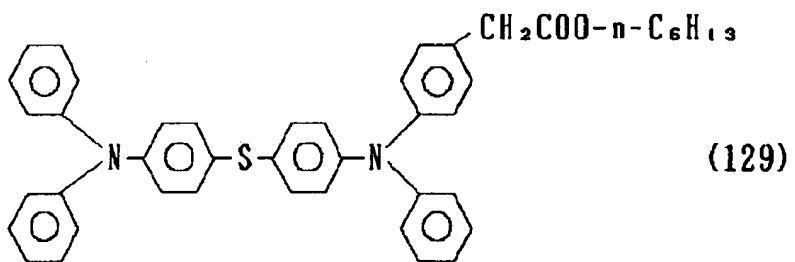
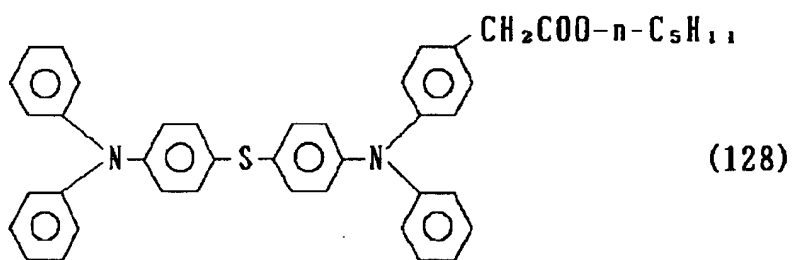
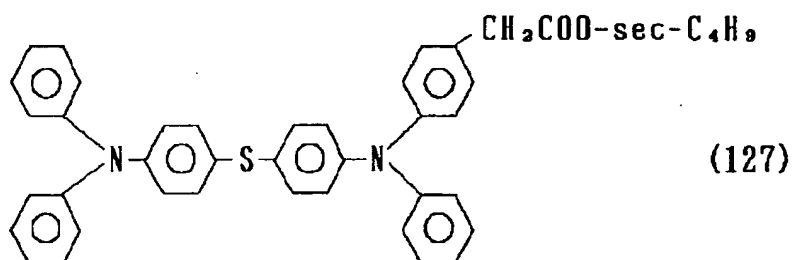
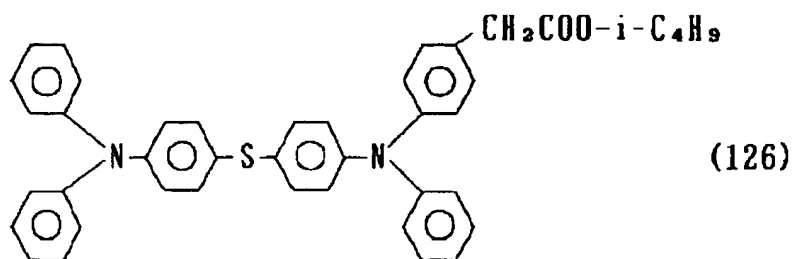
[0040]
[Formula 33]



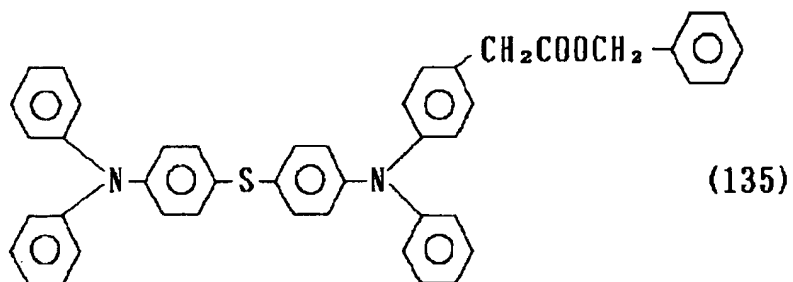
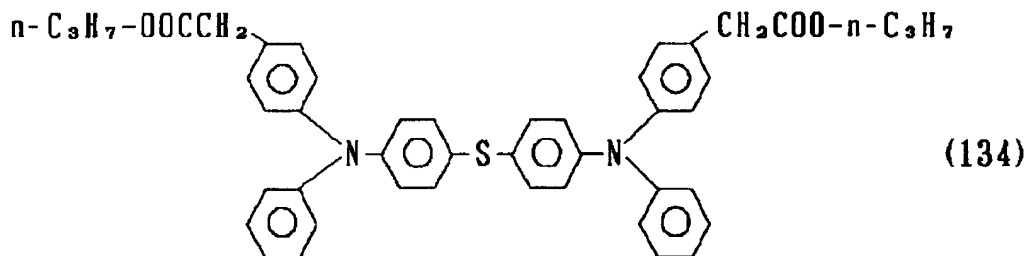
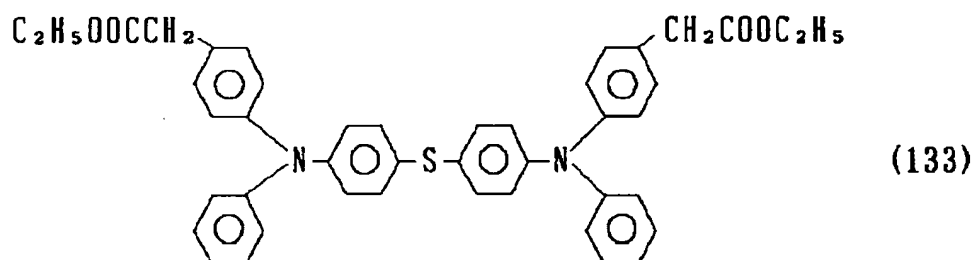
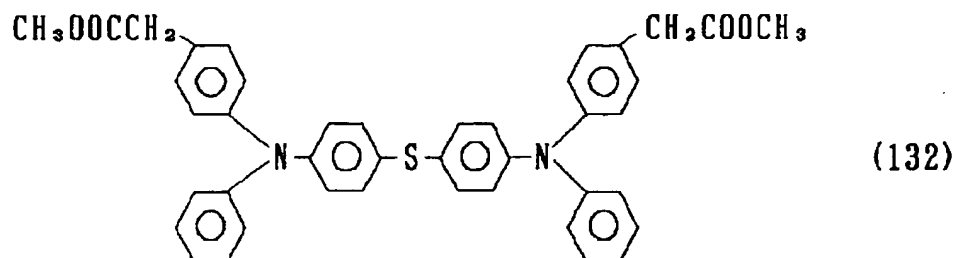
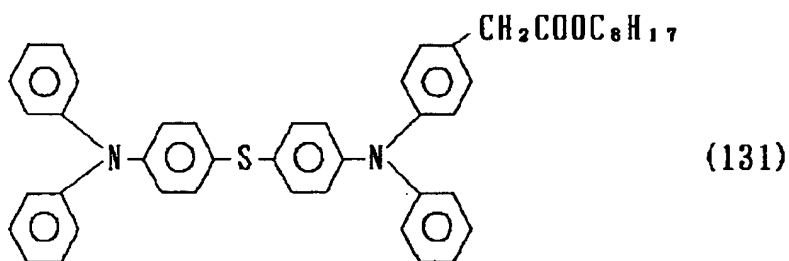
[0041]
[Formula 34]



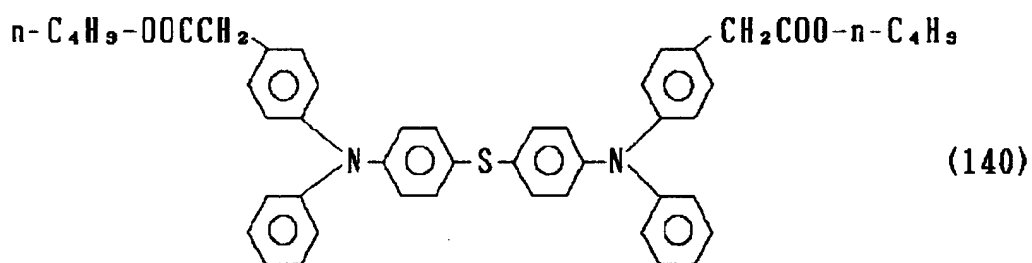
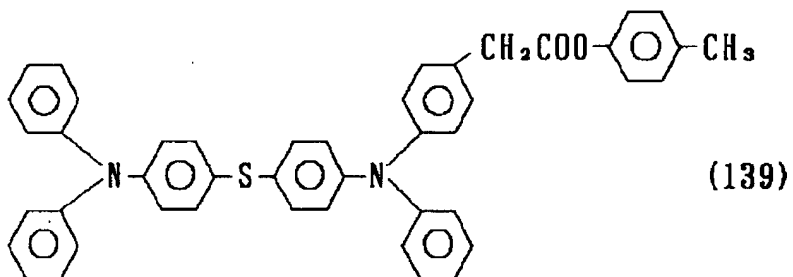
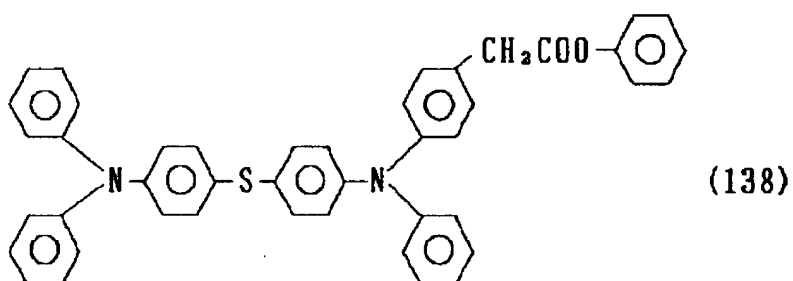
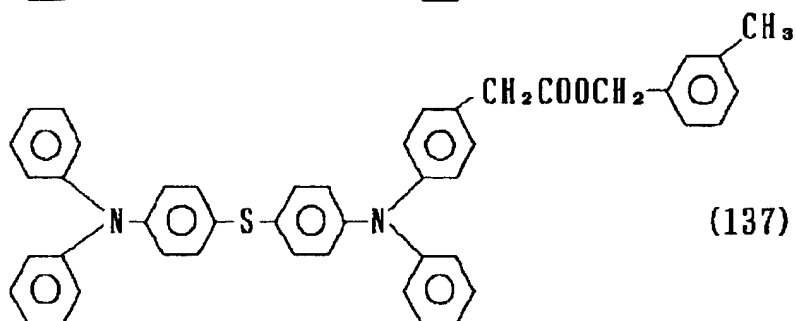
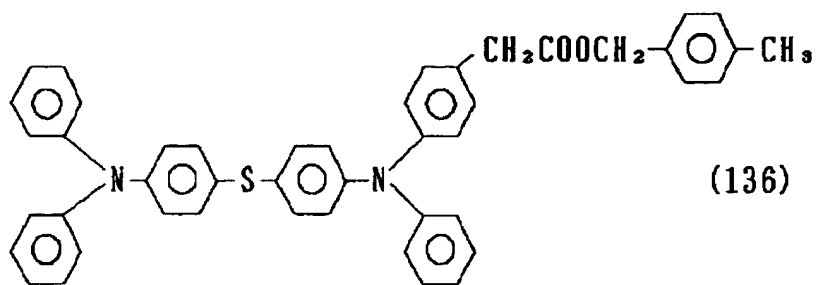
[0042]
[Formula 35]



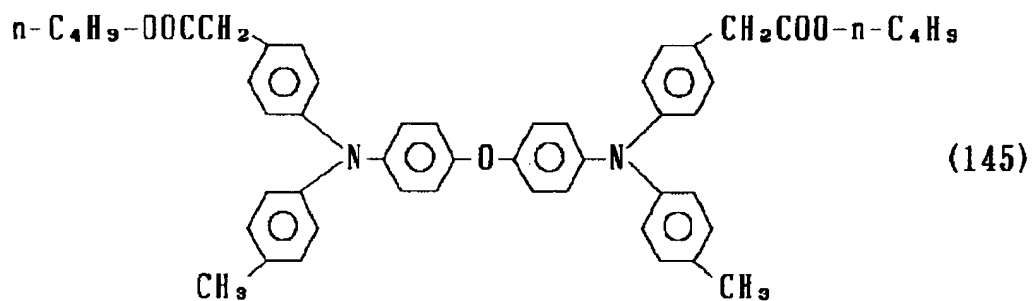
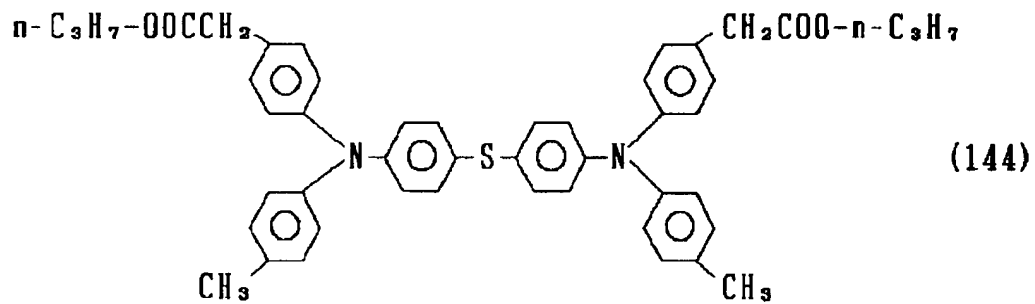
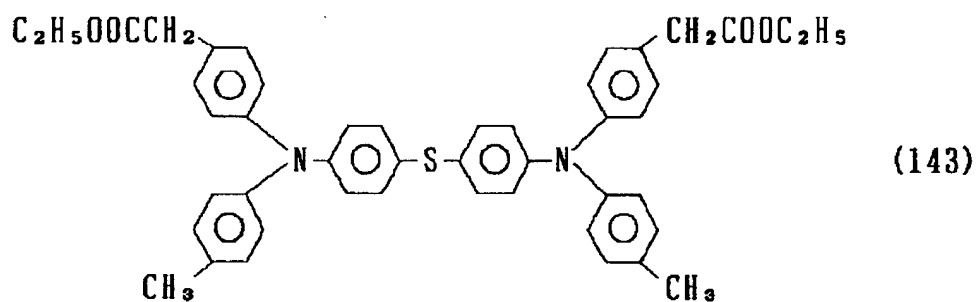
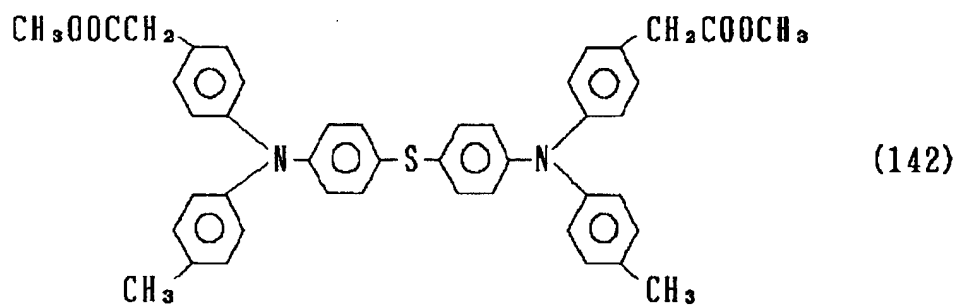
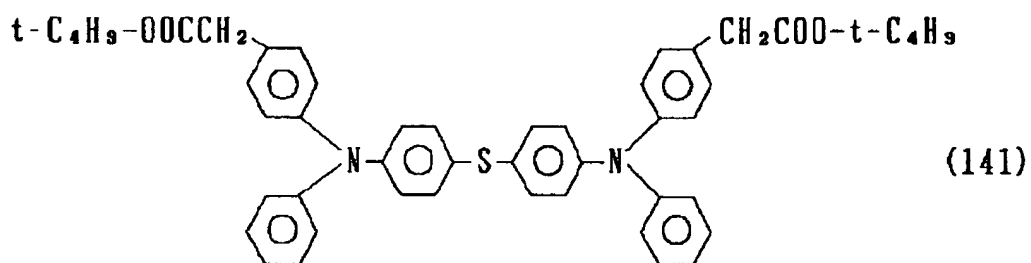
[0043]
[Formula 36]



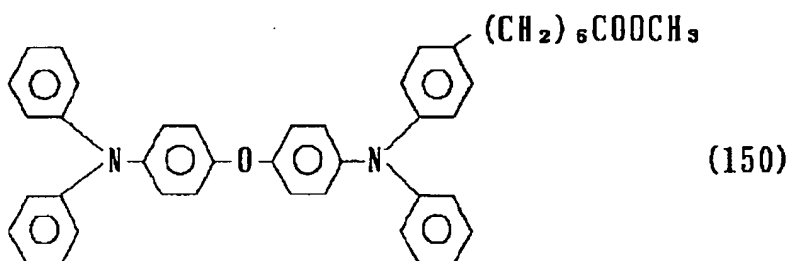
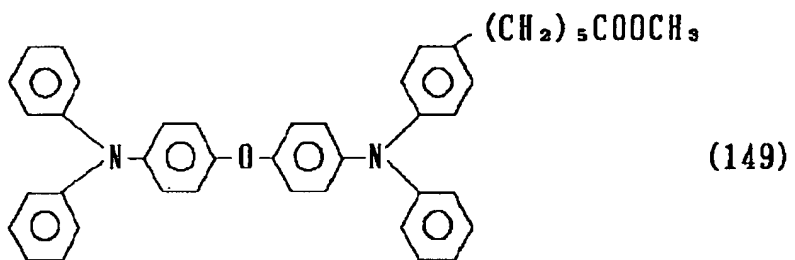
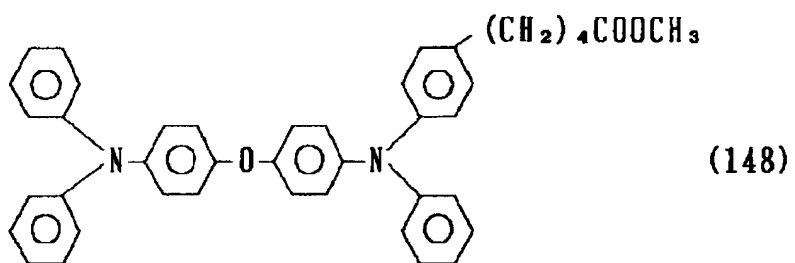
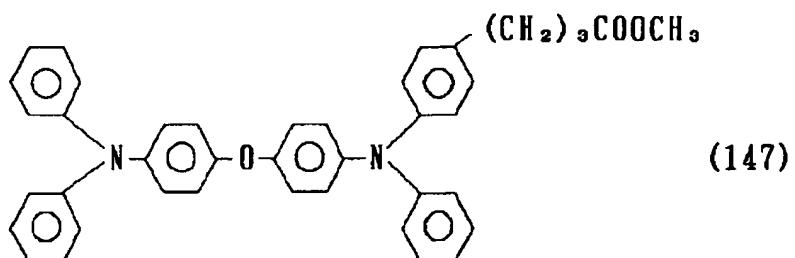
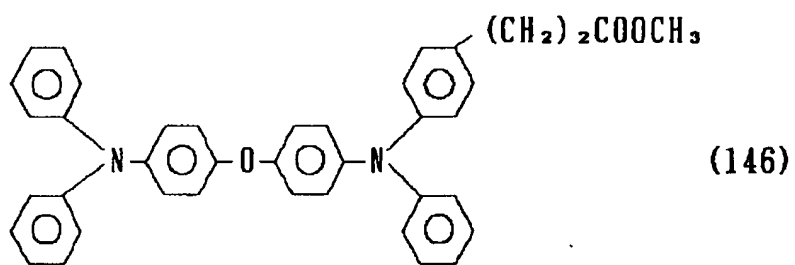
[0044]
[Formula 37]



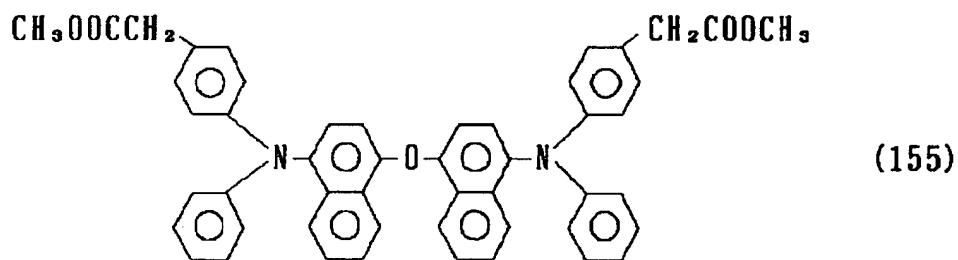
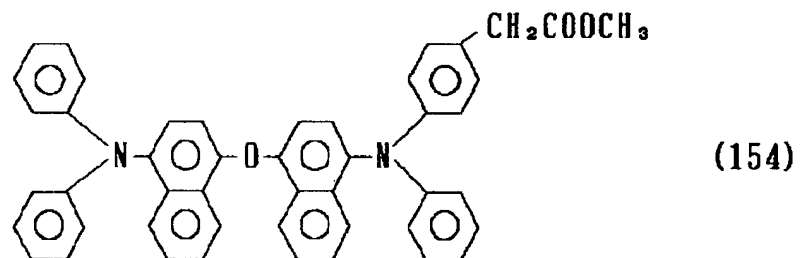
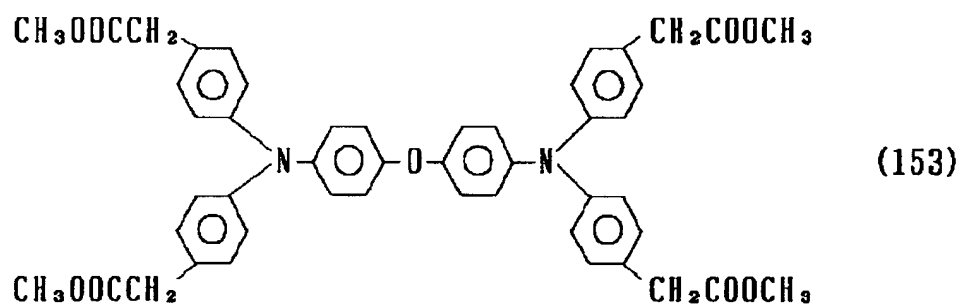
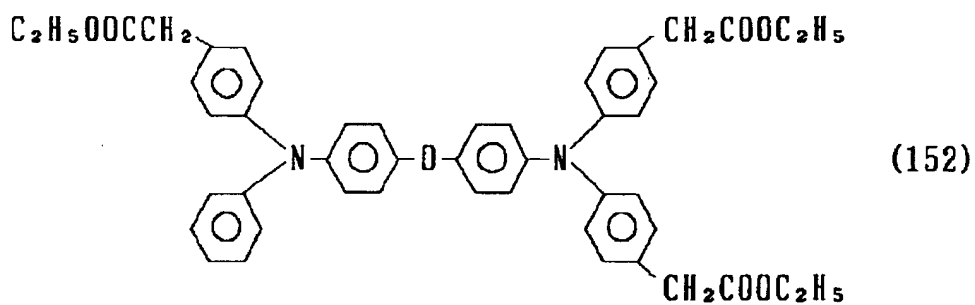
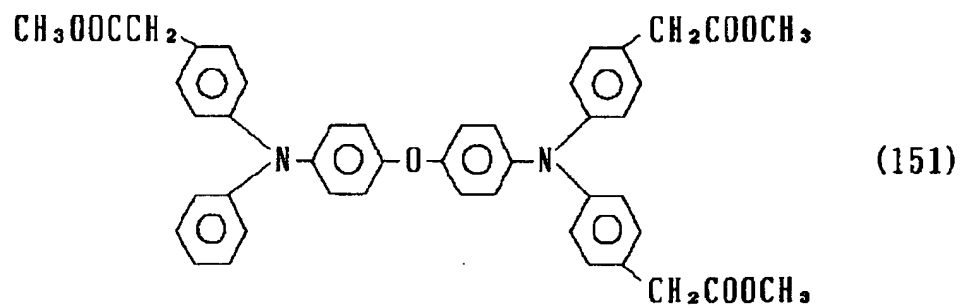
[0045]
[Formula 38]



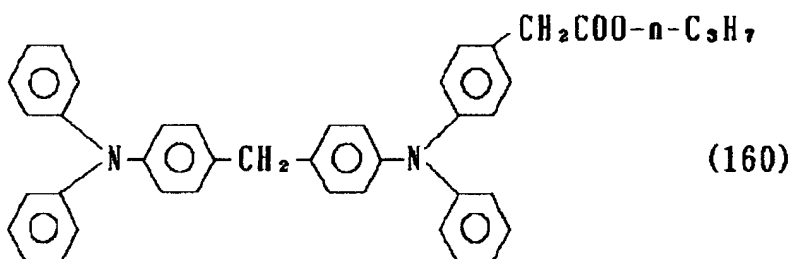
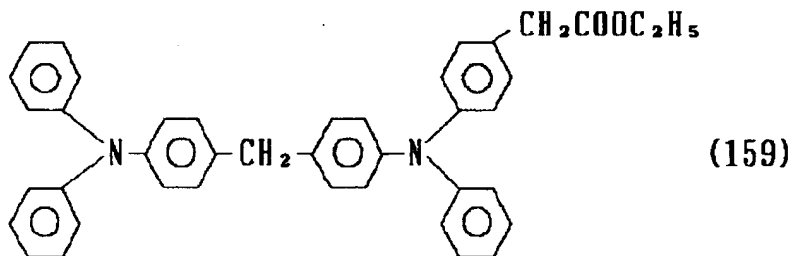
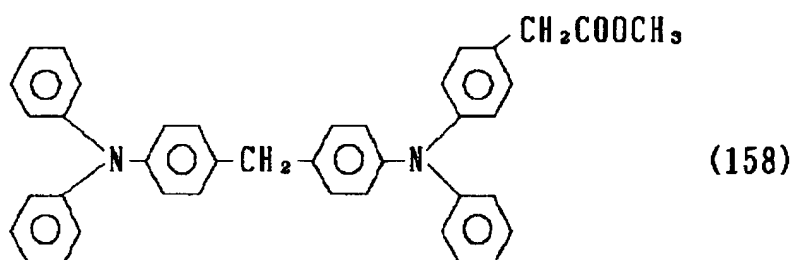
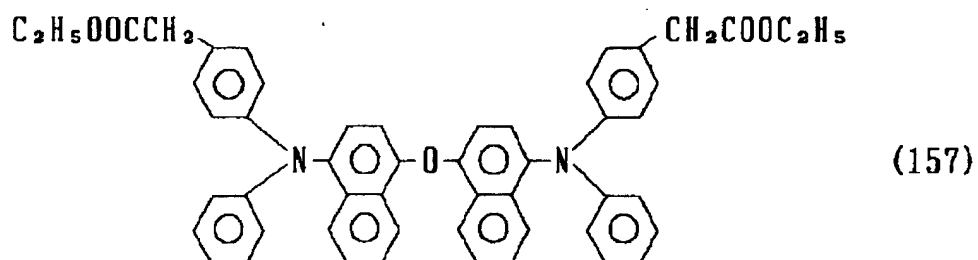
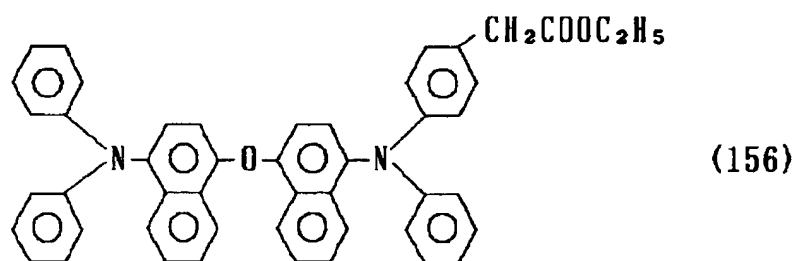
[0046]
[Formula 39]



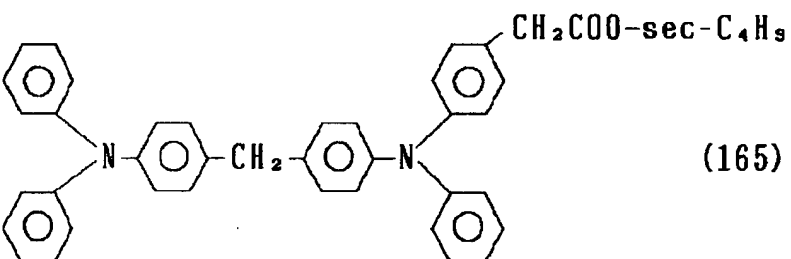
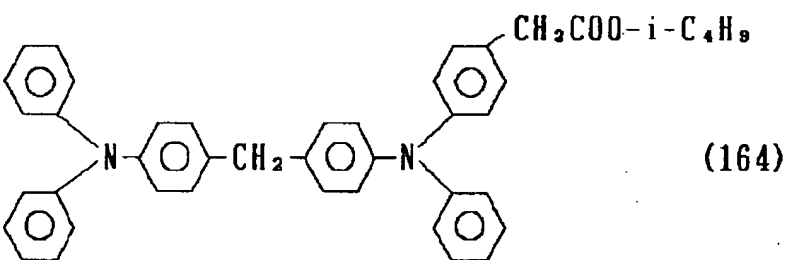
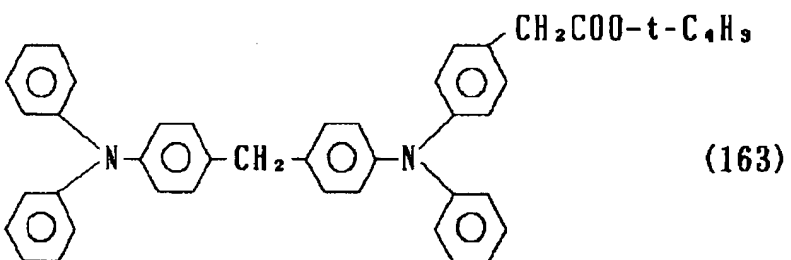
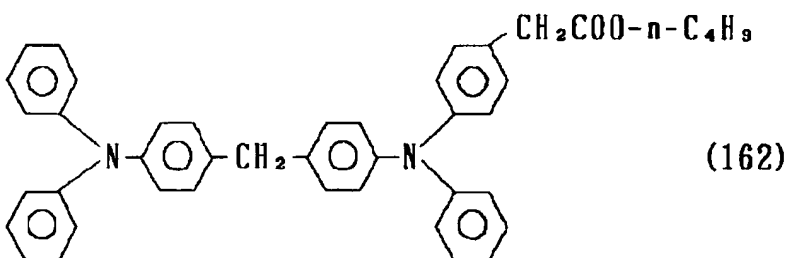
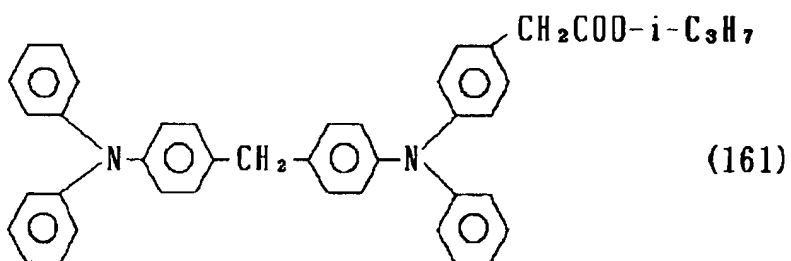
[0047]
[Formula 40]



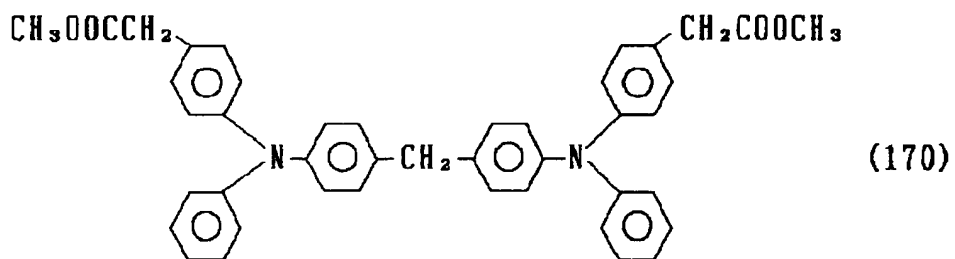
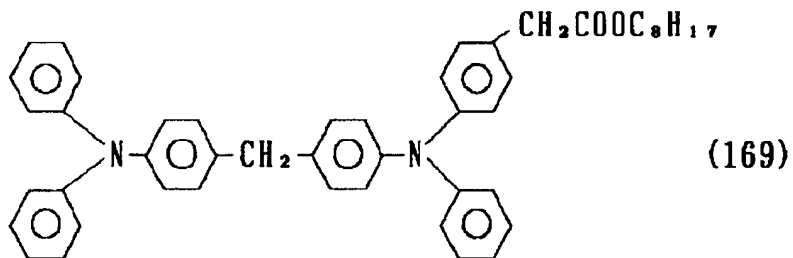
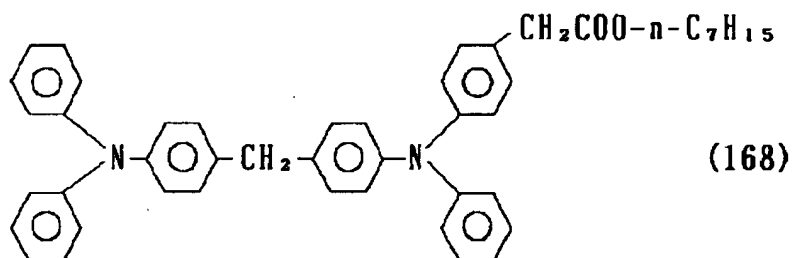
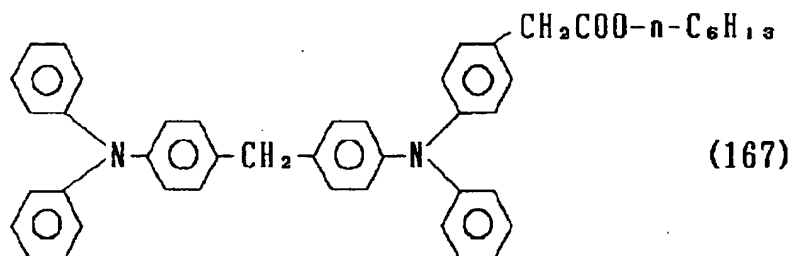
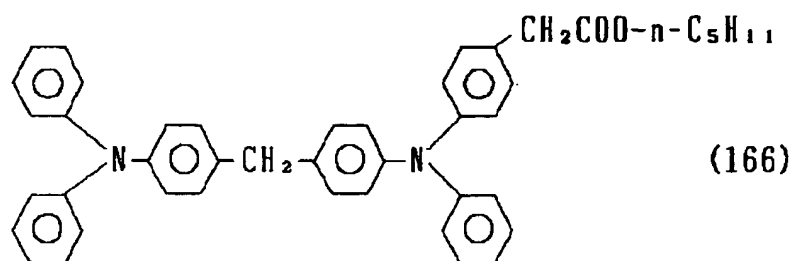
[0048]
[Formula 41]



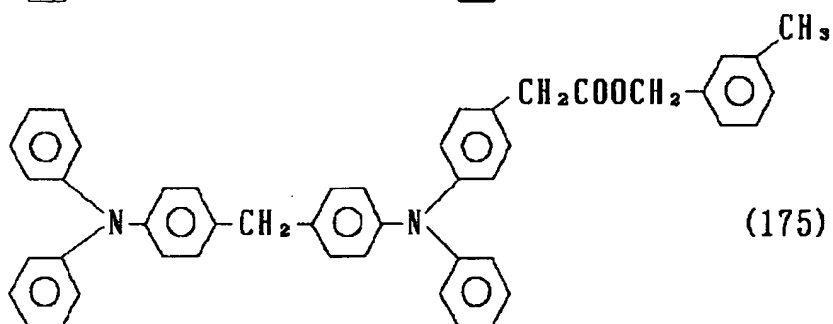
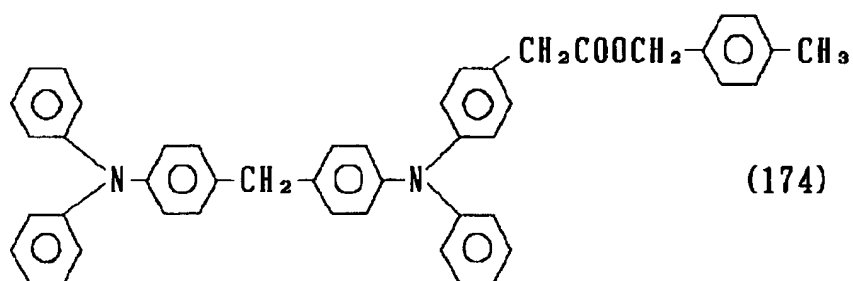
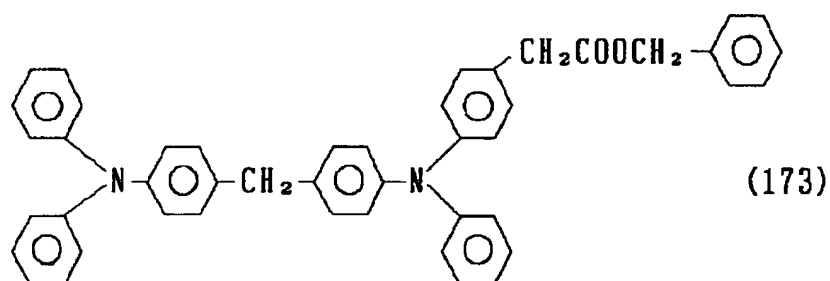
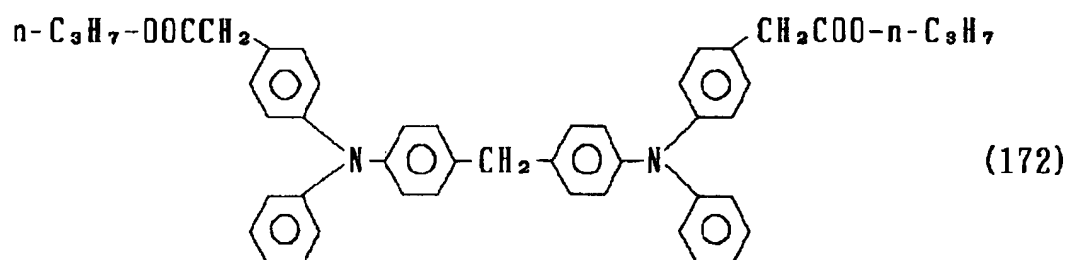
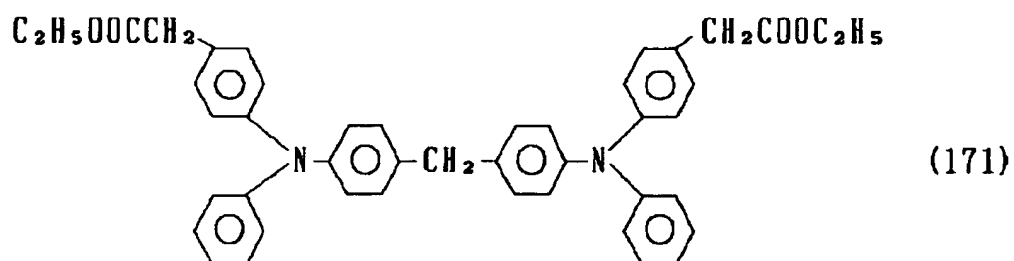
[0049]
[Formula 42]



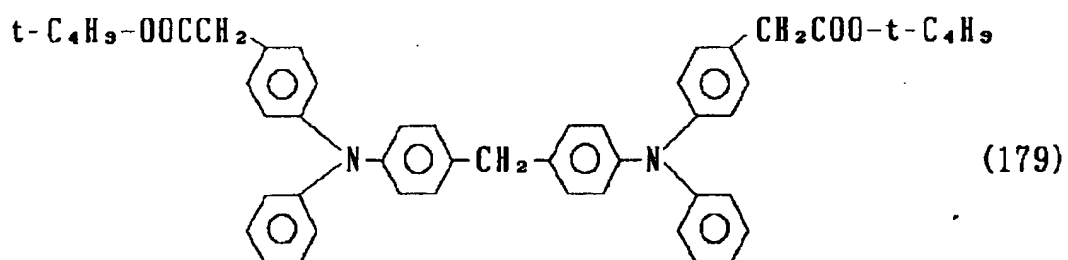
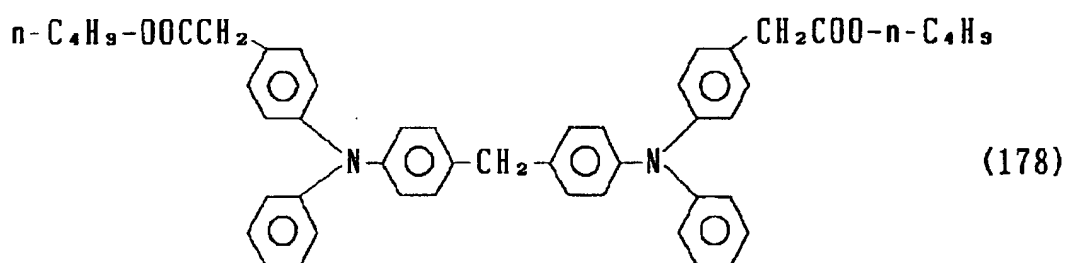
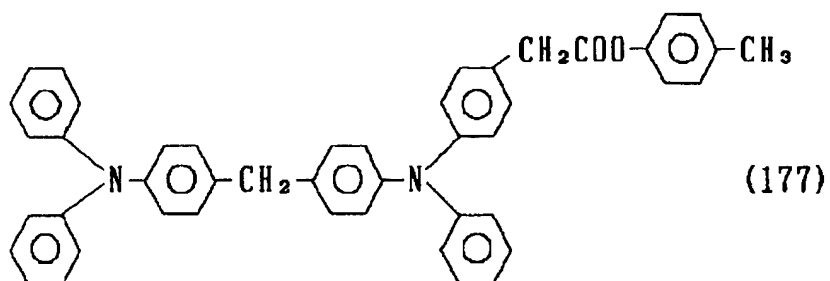
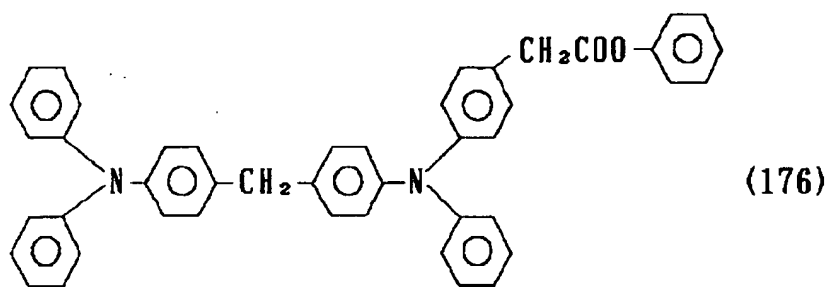
[0050]
[Formula 43]



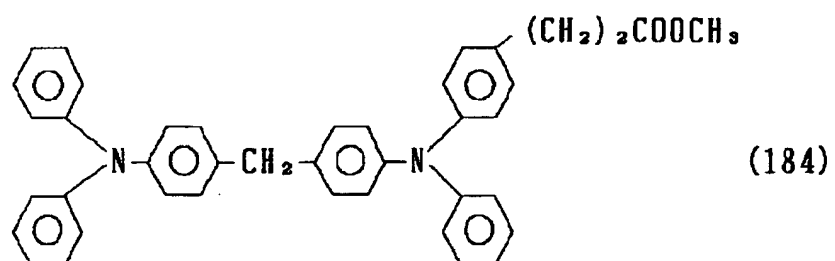
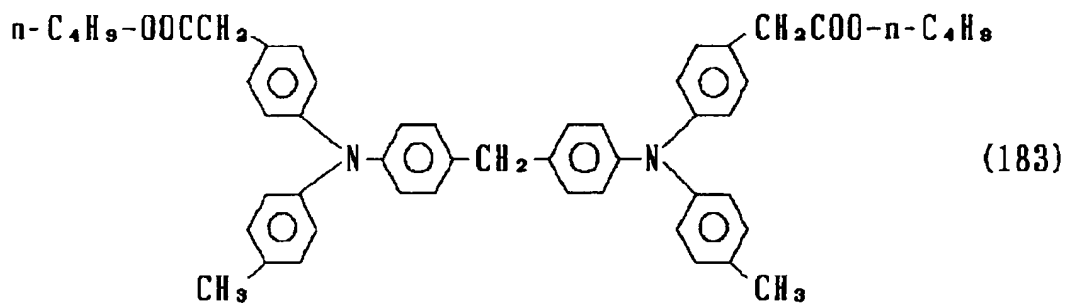
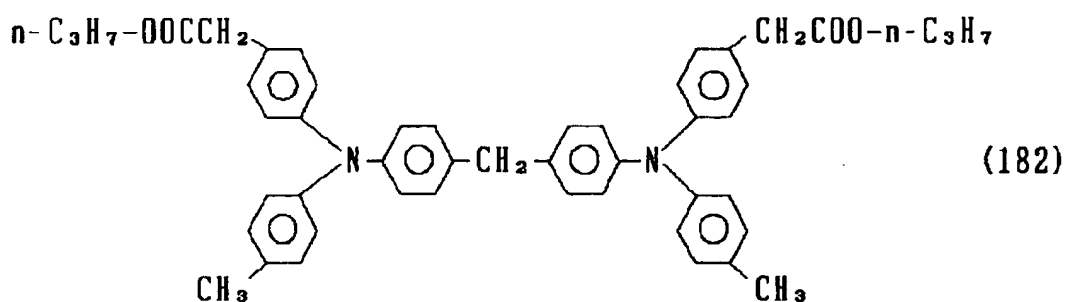
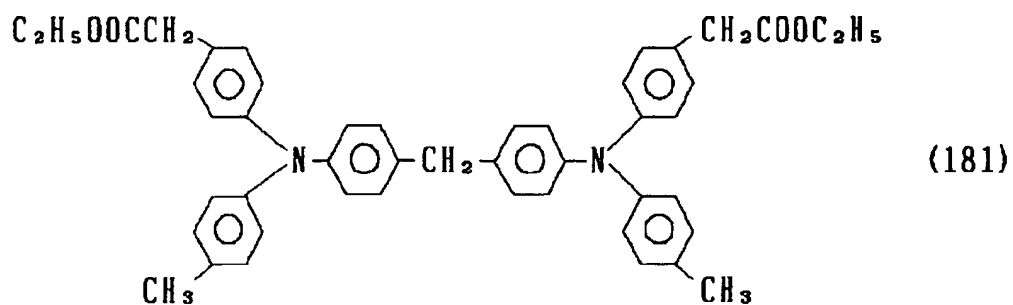
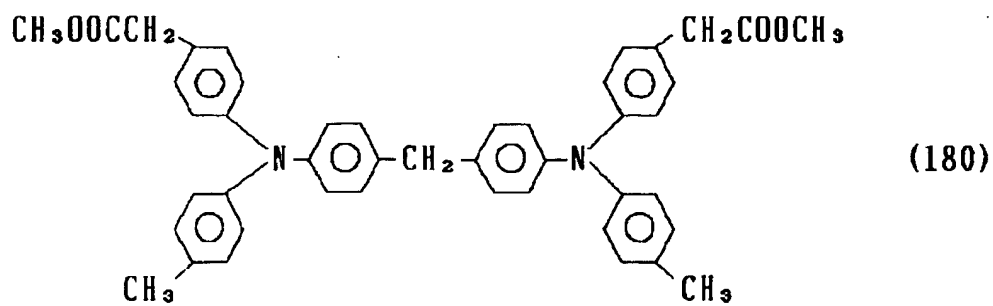
[0051]
[Formula 44]



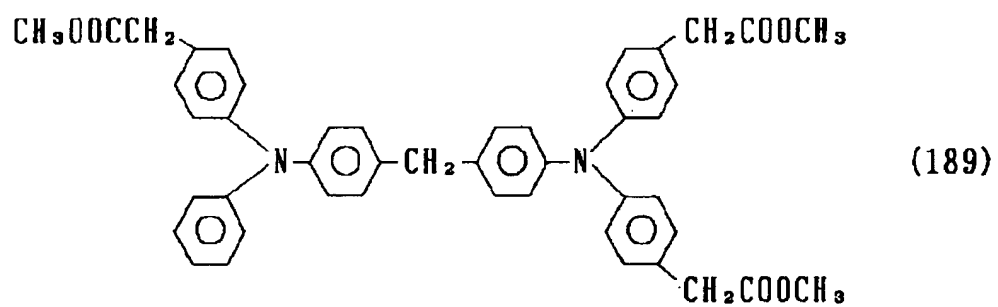
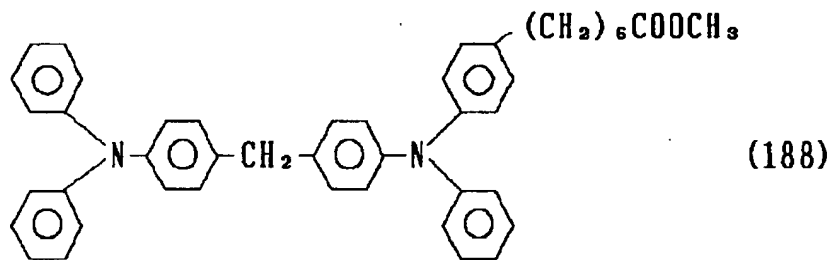
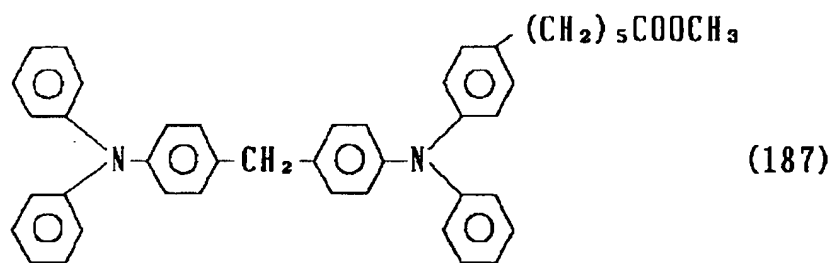
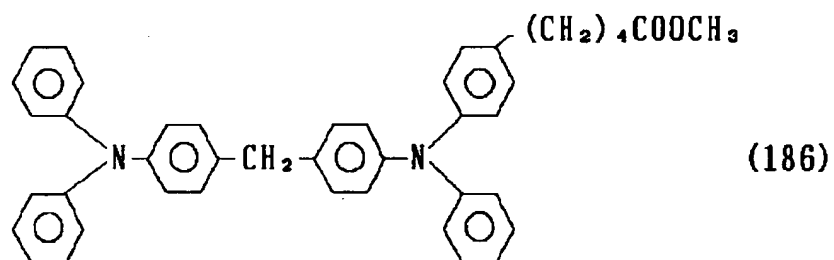
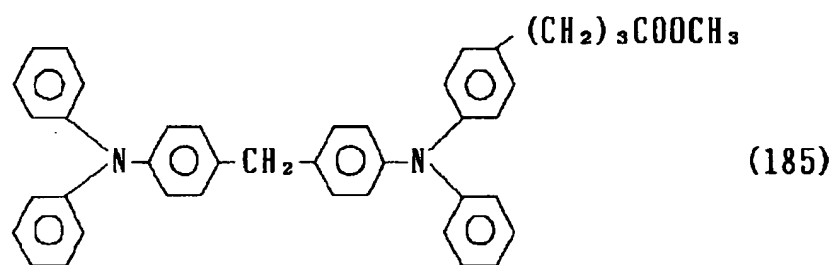
[0052]
[Formula 45]



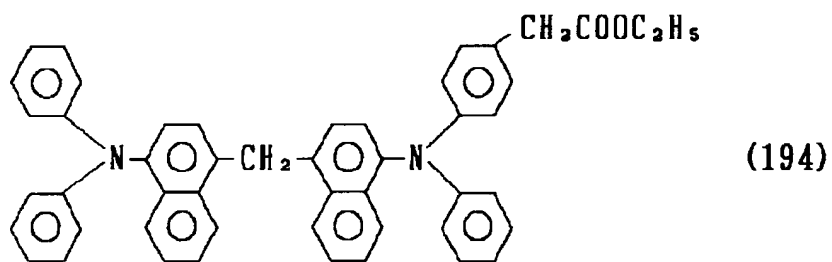
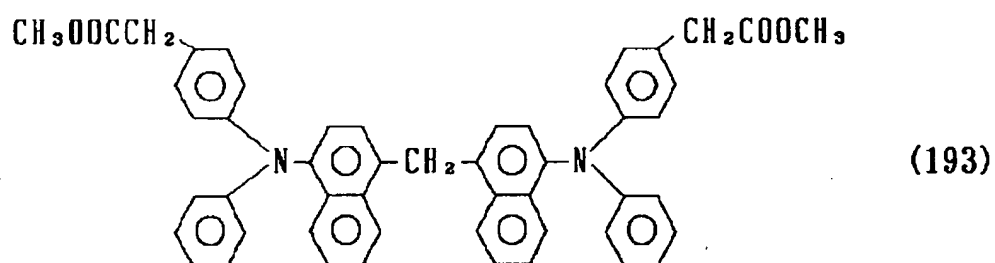
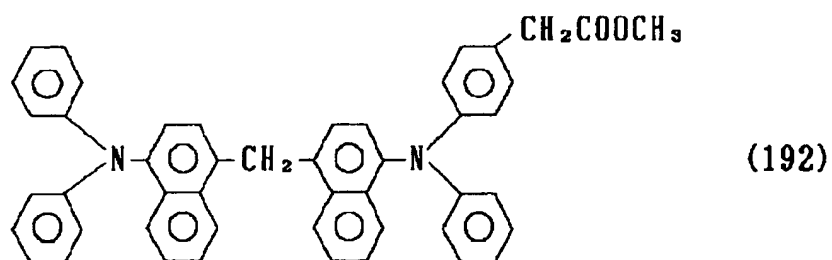
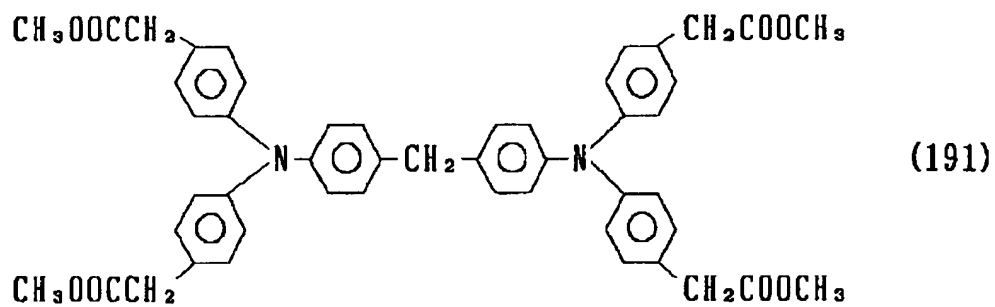
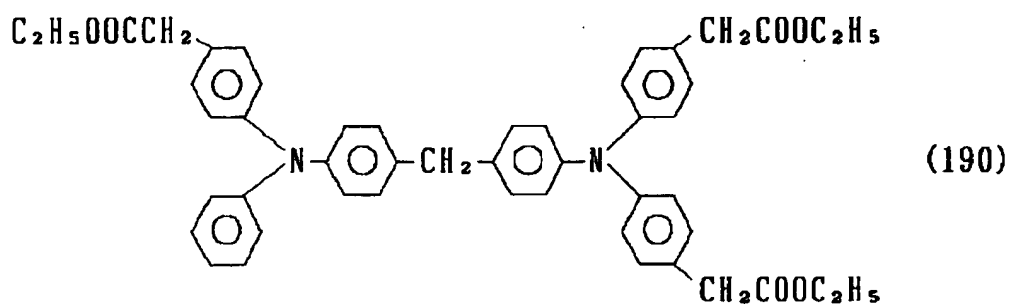
[0053]
[Formula 46]



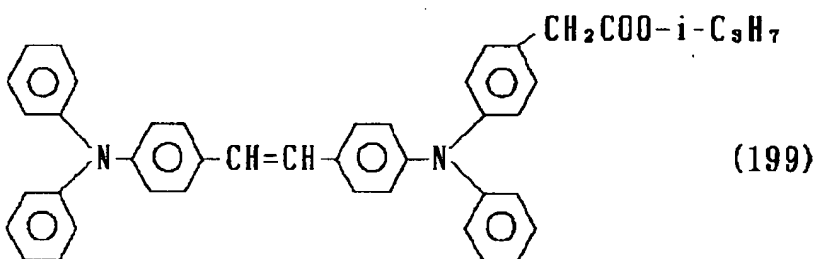
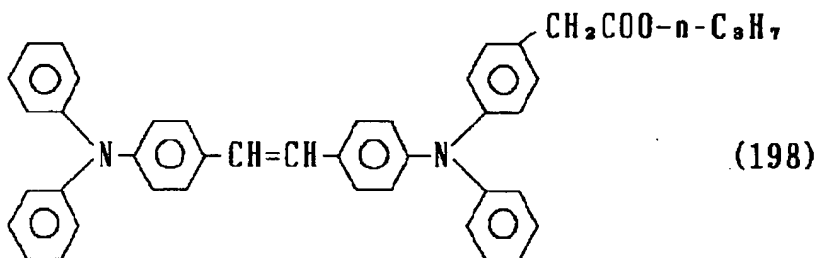
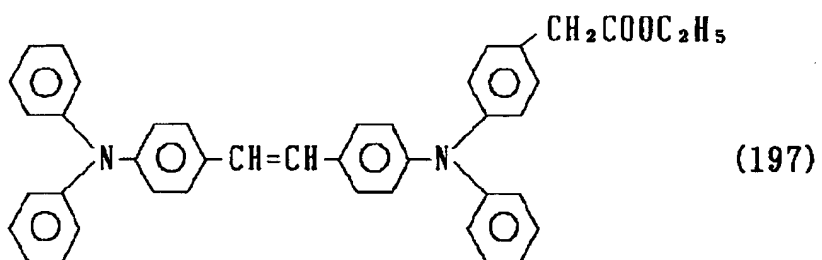
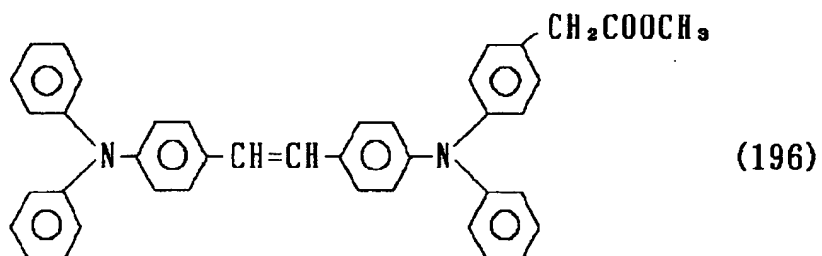
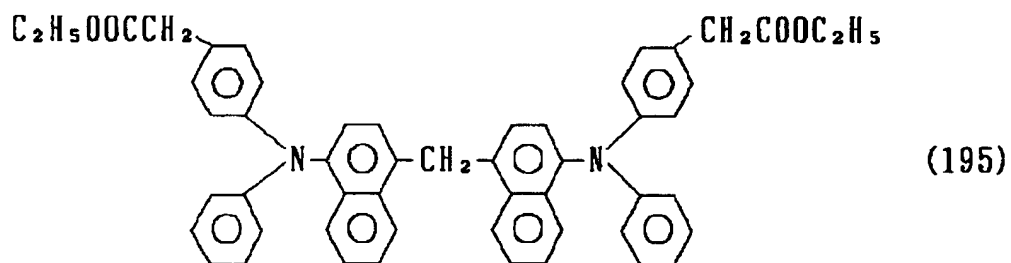
[0054]
[Formula 47]



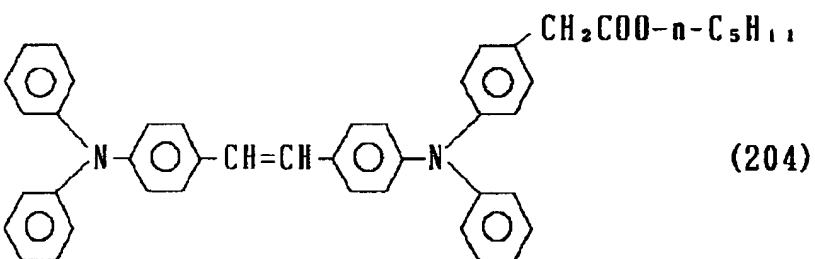
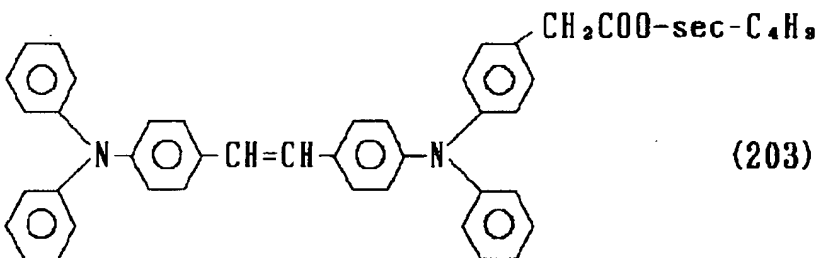
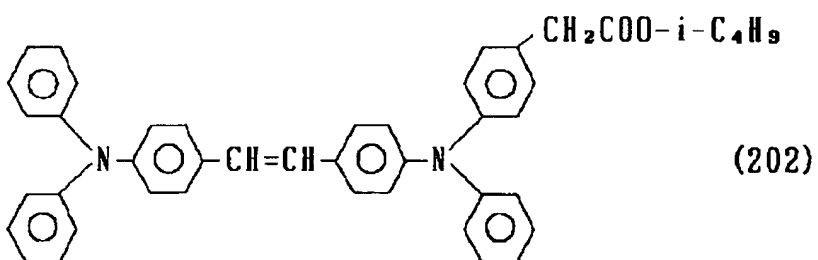
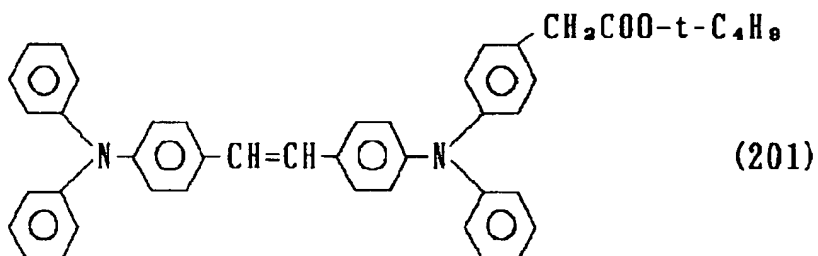
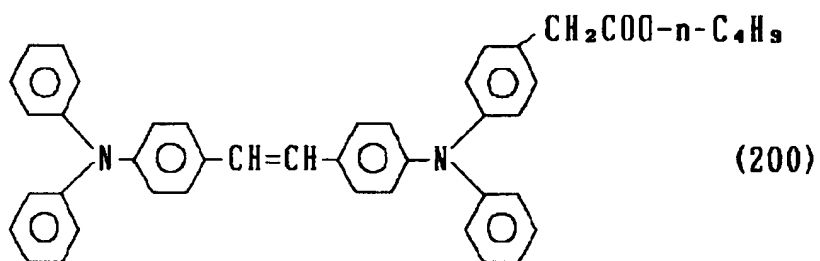
[0055]
[Formula 48]



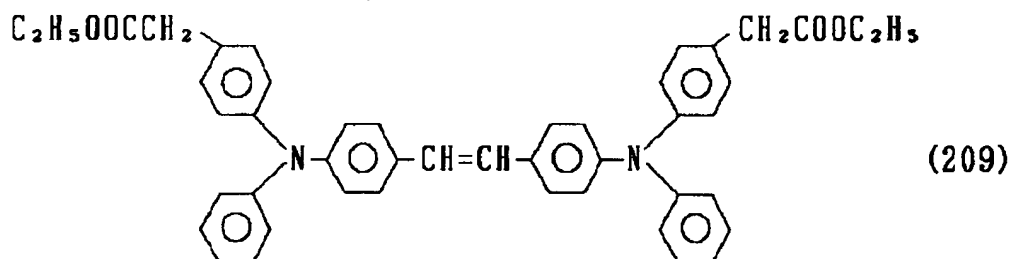
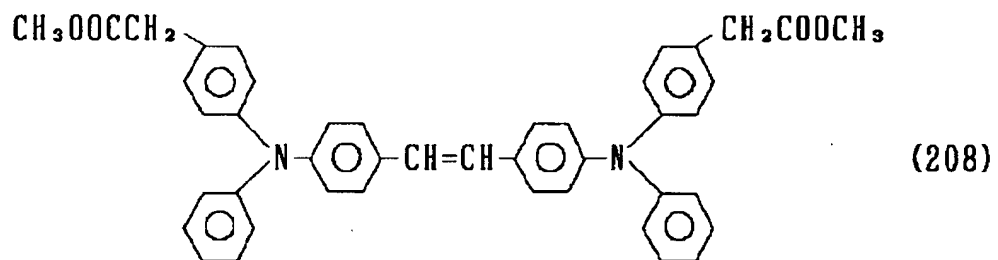
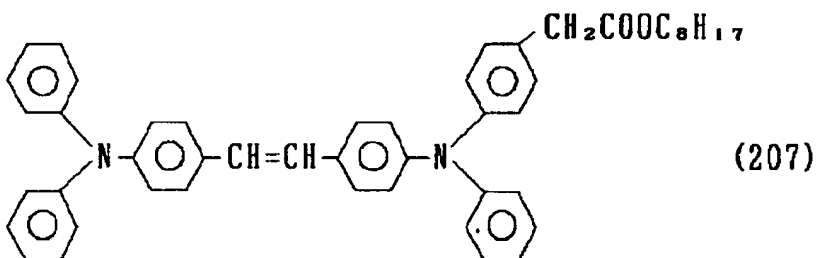
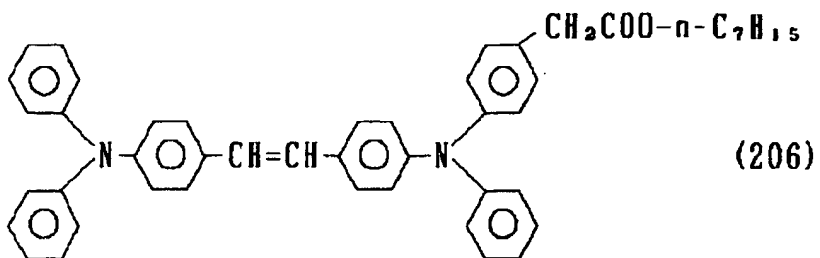
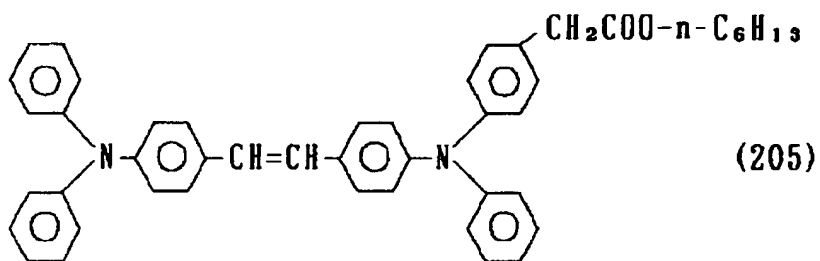
[0056]
[Formula 49]



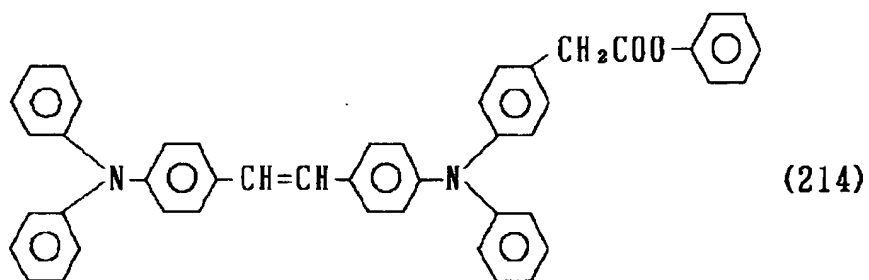
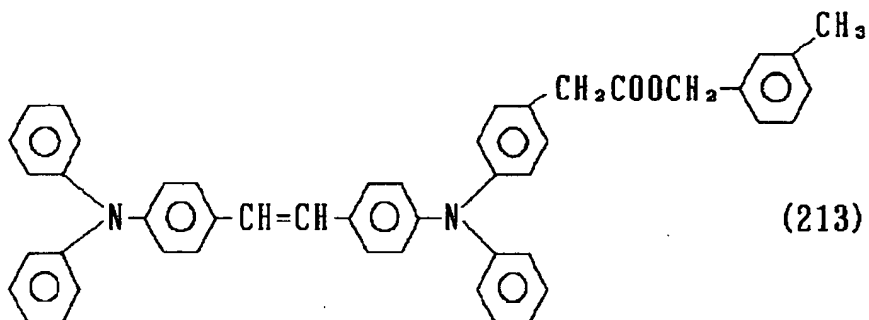
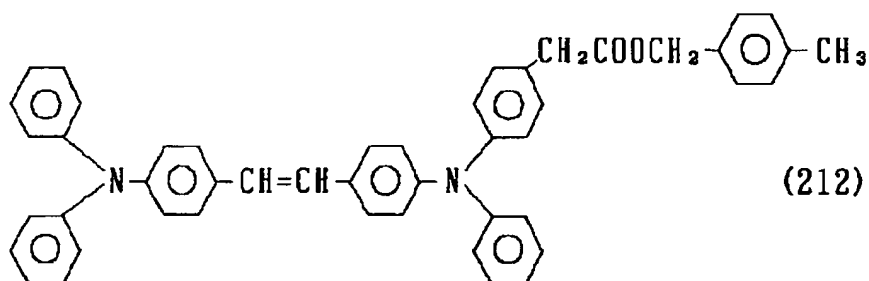
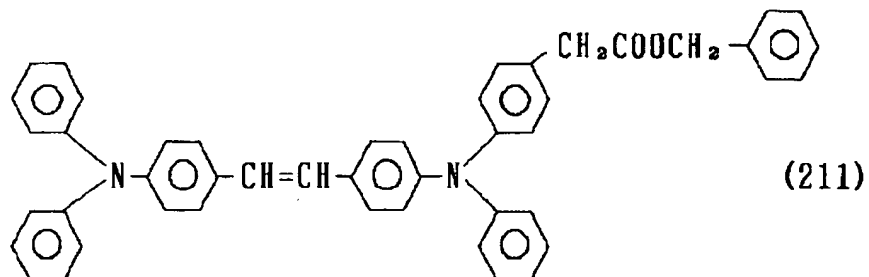
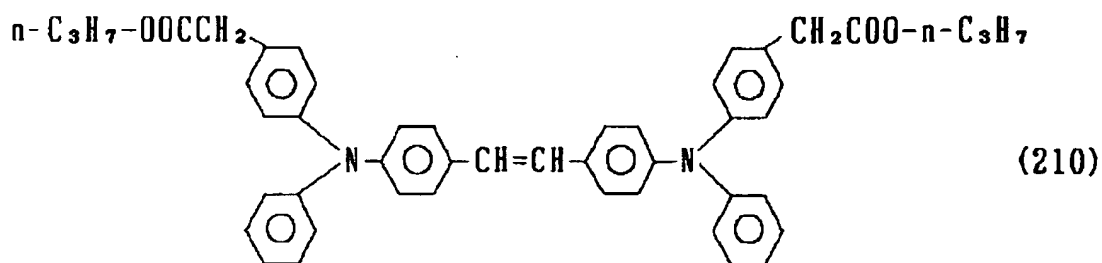
[0057]
[Formula 50]



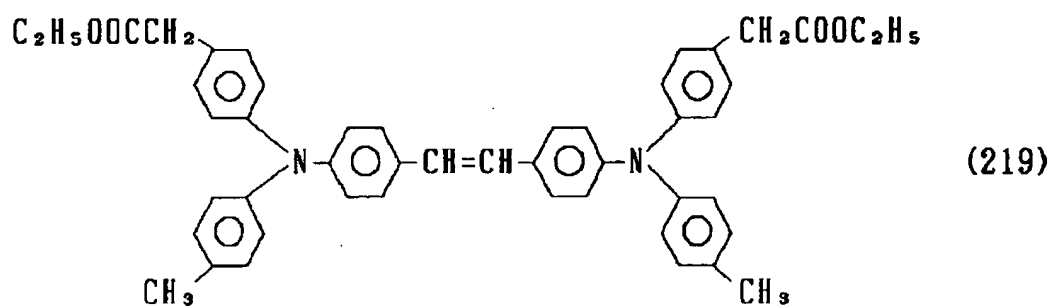
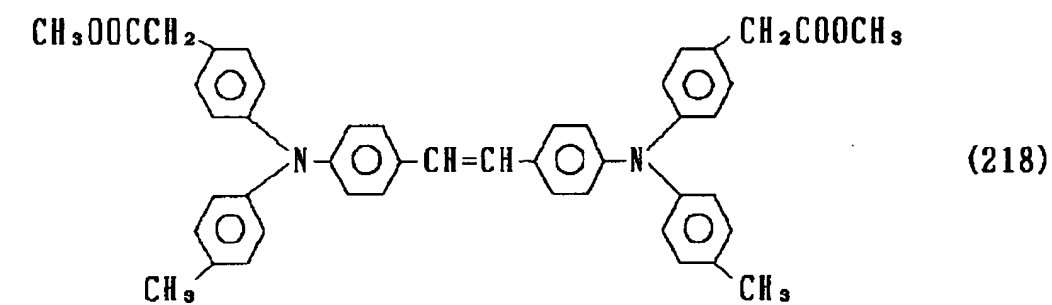
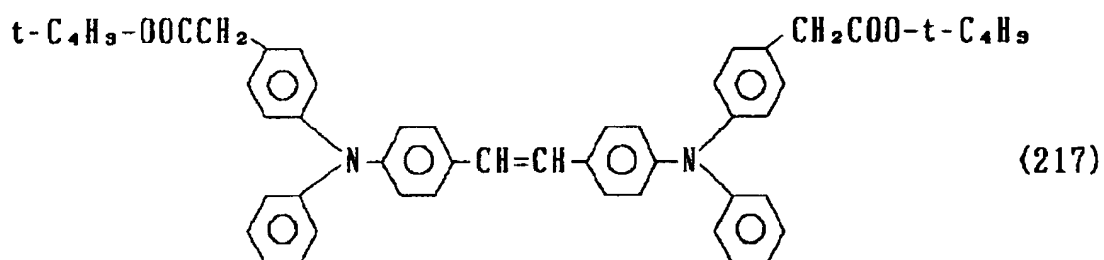
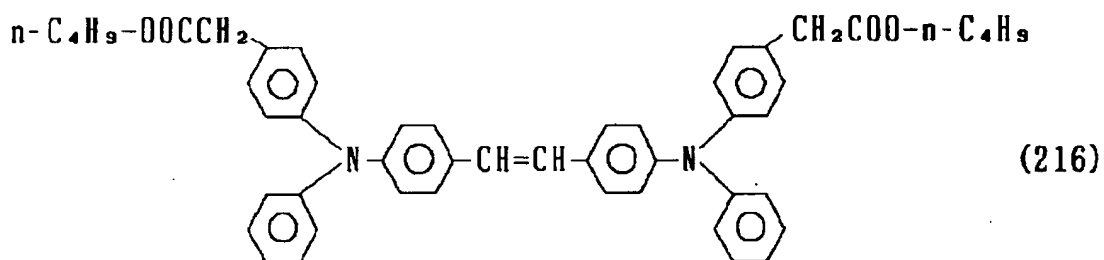
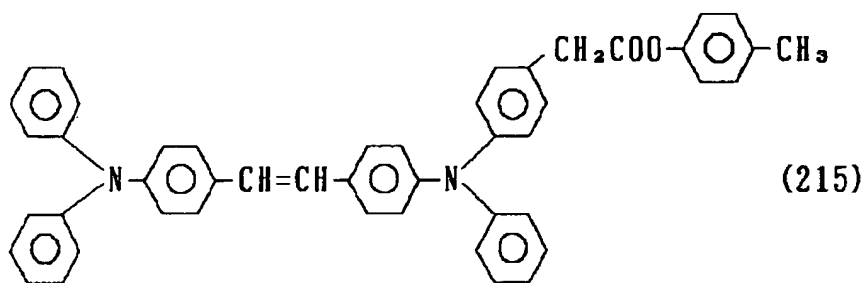
[0058]
[Formula 51]



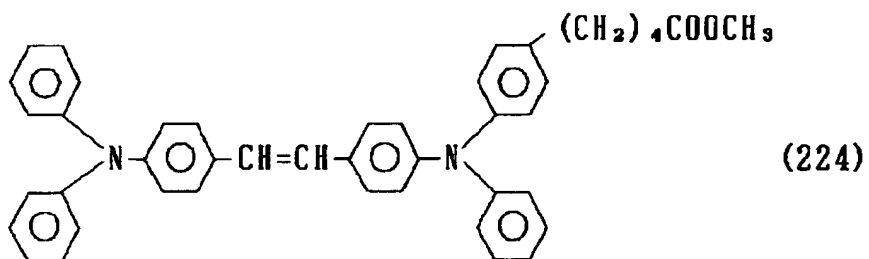
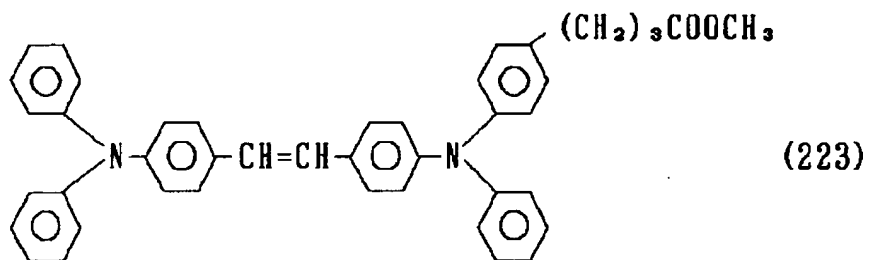
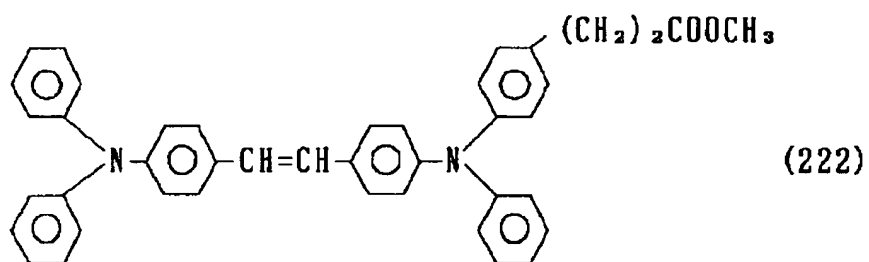
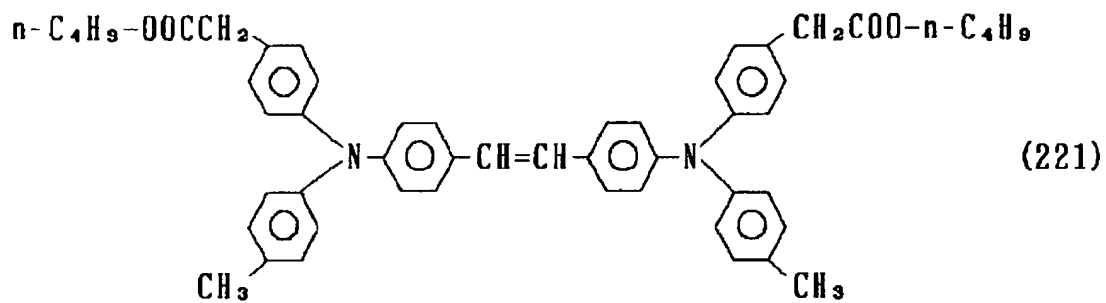
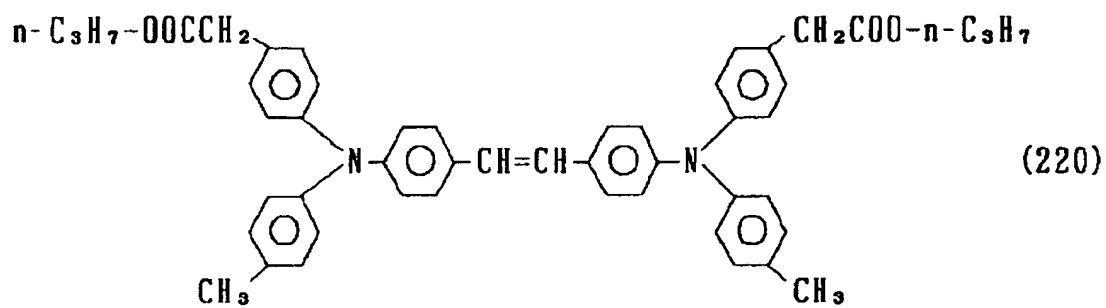
[0059]
[Formula 52]



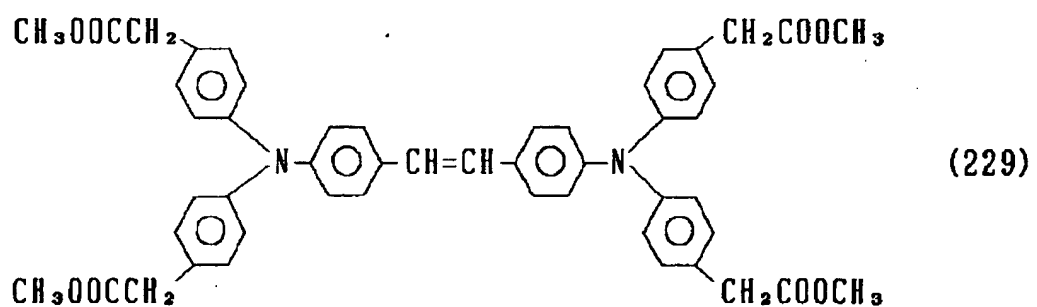
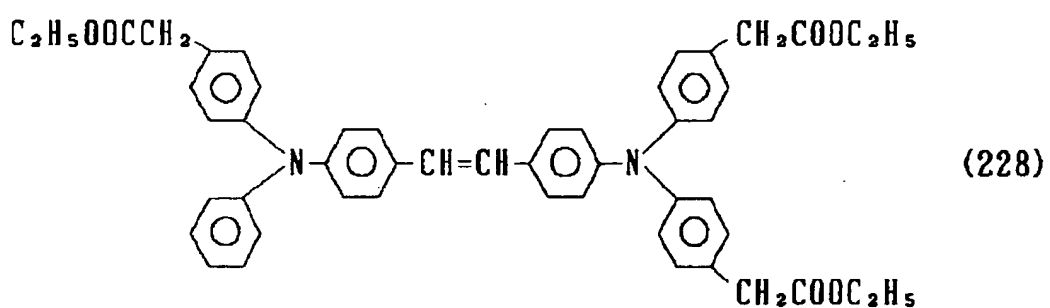
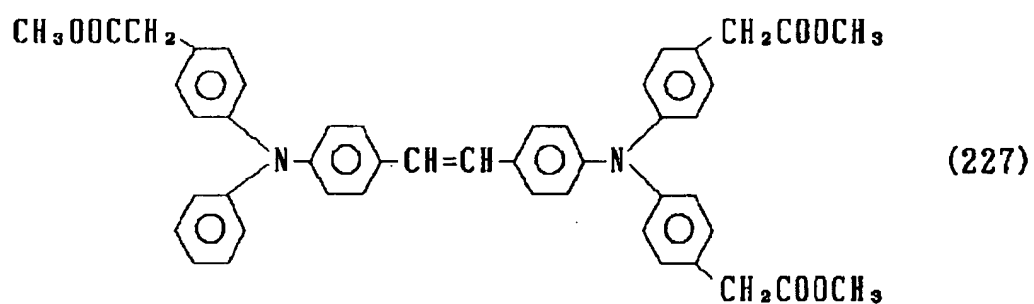
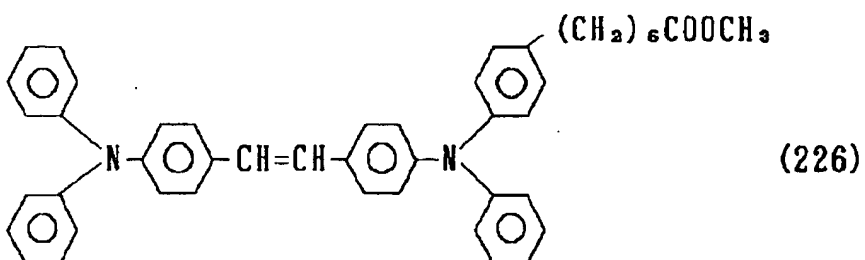
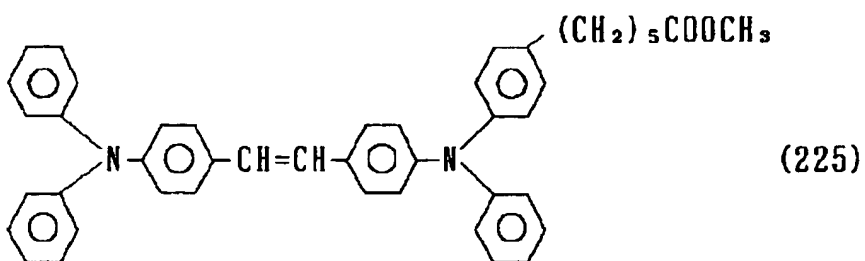
[0060]
[Formula 53]



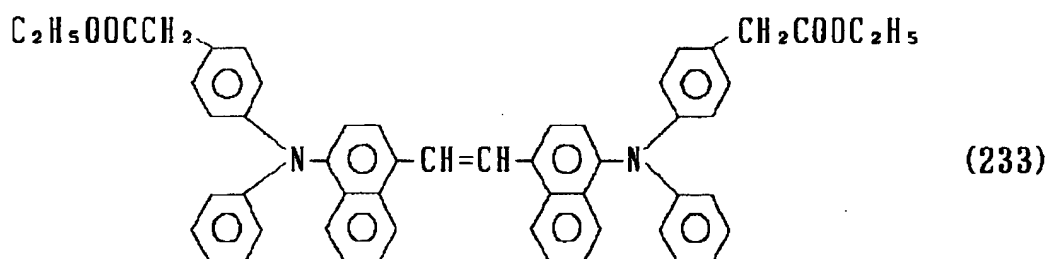
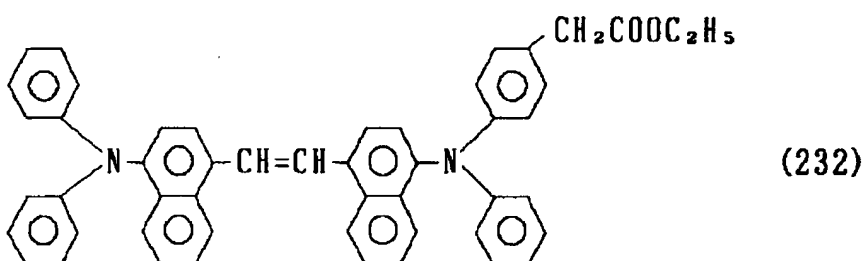
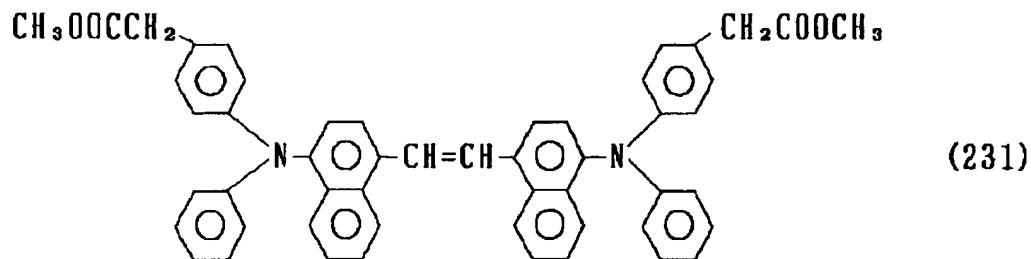
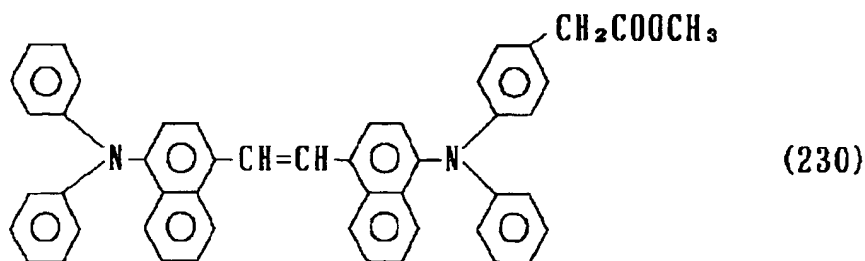
[0061]
[Formula 54]



[0062]
[Formula 55]



[0063]
[Formula 56]



[0064] These compounds are meltable to many solvents. For example, benzene, toluene, Aromatic series system solvents, such as a xylene, a tetralin, and a chlorobenzene; Dichloromethane, Halogen system solvents, such as chloroform, a trichloroethylene, tetrachloroethylene, and a carbon tetrachloride; Methyl acetate, Ester solvents, such as ethyl acetate, propyl acetate, methyl formate, and an ethyl formate; An acetone, Ketones, such as a methyl ethyl ketone; Diethylether, the dipropyl ether, Alcohols solvents, such as ethers solvent; methanols, such as dioxane and a tetrahydrofuran, ethanol, and isopropyl alcohol; it is meltable to dimethylformamide, dimethylacetamide, dimethyl sulfoxide, etc.

[0065] In producing an electrophotography photo conductor, for example, a charge generating layer and a charge transportation layer are made to form in the shape of a thin film on a conductive base material. As a base material of a conductive base material, metals, such as aluminum and nickel, a metal vacuum evaporation high polymer film, a metal lamination high polymer film, etc. can be used, and a conductive base material is formed with the gestalt of the shape of the shape of a drum, the shape of a sheet, and a belt.

[0066] A charge generating layer consists of a binder and an additive charge generating material and if needed, and can be produced by approaches, such as vacuum deposition, a plasma-CVD method, and a coating method. Especially as charge generating material, it is not limited, if the light of the specific wavelength irradiated is absorbed and a charge may be generated from effectiveness, both an organic material and an inorganic material can be used suitably, but in the case of an inorganic material, since a problem is in the problem and economical efficiency of a public nuisance like the above, it is desirable to use an organic material in this viewpoint. As organic charge generating material, a perylene pigment, a polycyclic quinone system pigment, a non-metal phthalocyanine pigment, a metal phthalocyanine pigment, a

bis-azo pigment, a tris azo pigment, thia pyrylium salt, a square RIUMU salt, an AZURENIUMU pigment, etc. are mentioned, for example, you make it able to distribute mainly in a binder, and these can form a charge generating layer by coating. As inorganic charge generating material, a selenium, a selenium alloy, a cadmium sulfide, a zinc oxide, an amorphous silicon, amorphous silicon carbide, etc. are mentioned. thickness of the formed charge generating layer 0.1 -- or -- 2.0 micrometers desirable -- further -- desirable -- 0.1 -- or -- 1.0 micrometers it is .

[0067] Next, the charge transportation layer containing the thoria reel amine system compound in connection with this invention is made to form in the upper part of this charge generating layer in the shape of a thin film. What is necessary is to mainly use a coating method, to dissolve in a solvent with a binder if needed, to carry out coating of the thoria reel amine system compound in connection with this invention on a charge generating layer, and just to dry it after that as a thin film forming method. It is not limited especially if it is the solvent which the binder used as a solvent used if needed [above / compound and if needed] dissolves, and a charge generating layer does not dissolve. It is not limited especially if the binder used if needed is insulating resin. For example, condensed system polymers, such as a polycarbonate, polyarylate, polyester, and a polyamide; Polyethylene, Polystyrene and styrene-acrylic copolymer; Polyacrylate, polymethacrylate, A polyvinyl butyral, a polyacrylonitrile, polyacrylamide, Addition polymers, such as an acrylonitrile-butadiene copolymer, a polyvinyl chloride, and a vinyl chloride vinyl acetate copolymer; polysulfone, polyether sulphone, silicon resin, etc. are used suitably, and a kind or two sorts or more of things can be mixed and used. the thoria reel amine system compound in connection with this invention in the amount of the above-mentioned binder used -- receiving -- 0.1 thru/or 3-fold quantitative ratio -- it is -- desirable -- They are 0.1 thru/or a double quantitative ratio. Charge transportation material concentration [in / that the amount of a binder is size from this / a charge transportation layer] becomes small, and sensibility worsens.

[0068] Moreover, in this invention, it can also use combining the aforementioned well-known charge transportation material if needed. It is also possible for especially the coating means of a charge transportation layer not to be limited, to be able to use suitably a dip coater, a bar coating machine, a calender coating machine, a gravure coating machine, a spin coater, etc., and to carry out electropainting. Thus, the thickness of the formed charge transportation layer is 10 thru/or 50 micrometers. They are 10 thru/or 30 micrometers desirable still more preferably. Thickness is 50 micrometers. The probability to come to require much time amount by transportation of a charge as it is size, and for a charge to be captured also causes a large next door sensibility fall. On the other hand, it is 10 micrometers. It becomes [a mechanical strength falls that it is smallness and / the life of a photo conductor] short and is not desirable.

[0069] The electrophotography photo conductor which carries out and contains the thoria reel amine system compound in connection with this invention in a charge transportation layer is producible like the above. In this electrophotography photo conductor, the adhesive property of a charge generating layer and a charge transportation layer is excellent, and did not have exfoliating in the cellophane tape friction test. Furthermore, in this invention, a glue line, an under-coating layer, a barrier layer, etc. can also be established if needed between a conductive base material and a charge generating layer.

[0070] In this way, you make it a photo conductor front face first charged in negative with a corona-electrical-charging vessel etc. on the occasion of use of the obtained electrophotography photo conductor. After electrification, by being exposed, a charge is generated within a charge generating layer, positive charge is poured in into a charge transportation layer, this is conveyed [be / it / under / charge transportation layer / passing] even to a front face, and a surface negative charge is neutralized. On the other hand, a negative charge will remain in the part which was not exposed. In the case of normal development, a forward electrification toner is used, and a toner will adhere to the part in which this negative charge remained, and negatives will be developed. In the case of reversal development, a negative electrification toner is used, and a toner will adhere to the part by which the charge was neutralized and negatives will be developed. The electrophotography photo conductor in this invention is usable also in which development approach, and can give high definition. Moreover, charge transportation material does not crystallize at the time of repeat use, and it is not admitted that a charge generating layer and a charge transportation layer exfoliate, either. Furthermore, the rise of rest potential is not observed at all, but can show high sensitivity and high endurance. Moreover, in this invention, a charge transportation layer can be first prepared on a conductive base material, a charge generating layer can be prepared on it, and an electrophotography photo conductor can also be produced. In this case, you will make it a photo conductor front face just charged first, the generated negative charge will neutralize the surface charge of a photo conductor after exposure, and positive charge will be conveyed to a conductive base material through a charge transportation layer.

[0071]

[Example] Hereafter, although this invention is concretely illustrated by the example and the example of a comparison, this invention is not limited to these examples.

[0072] 1n-butyl of synthetic examples 4-diphenyl aminophenyl acetate (instantiation compound (10)) Magnesium metal 2.9 g (0.12 mol) was put into 500ml4 Thu opening flask equipped with synthetic stirring equipment, a cooling pipe, nitrogen installation tubing, and a tap funnel, and the nitrogen purge was performed. Subsequently, desiccation diethylether 300 ml was put in and stirring was started. It is 4-chloro methyl triphenylamine 29.3g (0.1 mol) there. Diethylether solution 100 ml was dropped slowly. Reflux started gently in the place dropped about 10ml. Making it flow back, dropping of the diethylether solution was continued further and reflux was performed after dropping termination for further 1 hour. The Grignard reagent solution obtained as mentioned above was returned even to the room temperature, and then dry ice 13g was slowly added there under ice-cooling. After adding all dry ice, the reaction mixture was stirred at the room temperature for 2 hours, and the reaction was riped. Then, it hydrolyzed by dropping water 100 ml under ice-cooling. Lump which arose 0.1-N solution of hydrochloric acid was added, and it dissolved. Next, the ether layer was extracted, the saturation sodium-hydrogencarbonate water solution washed twice with water, and, subsequently it dried with anhydrous sodium sulfate. After desiccation, diethylether was distilled off and the white solid-state was obtained. This white solid-state was recrystallized in ethanol, and 24.9g (81% of yield) of 4-diphenyl aminophenyl acetic acids was obtained. Next, the heating dissolution of the 24.9g (0.081 mols) of this 4-diphenyl aminophenyl acetic acid was carried out at n-butanol 500 ml, 2ml of sulfuric acids was added, and reflux was performed for 5 hours. Then, it returned to the room temperature and 2l. of water was filled with the reaction mixture. The obtained white solid-state was filtered and it dried. n-butyl which a silica gel column refines this white solid-state, and is the specified substance 21.5g of 4-diphenyl aminophenyl acetate was obtained (74%).

[0073]

Rf=0.6 (ethyl acetate / n-hexane = 1/3)

Melting point: Example of 124.2 - 125.1 ** composition 2 thoria reel amine system compound (instantiation compound (64)) Magnesium metal 2.9 g (0.12 mol) was put into the 500 ml4 Thu opening flask equipped with synthetic stirring equipment, a cooling pipe, nitrogen installation tubing, and a tap funnel, and the nitrogen purge was performed. Subsequently, desiccation diethylether 300 ml was put in and stirring was started. It is 50.9g (0.1 mol) of screw [4-(chloro methylphenyl) phenyl]-p-phenylene diamines there. Diethylether solution 100 ml was dropped slowly. Reflux started gently in the place dropped about 10ml. Making it flow back, dropping of the diethylether solution was continued further and reflux was performed after dropping termination for further 1 hour. The Grignard reagent solution obtained as mentioned above was returned even to the room temperature, and then dry ice 13g was slowly added there under ice-cooling. After adding all dry ice, the reaction mixture was stirred at the room temperature for 2 hours, and the reaction was riped. Then, it hydrolyzed by dropping 100ml of water under ice-cooling. 0.1-N solution of hydrochloric acid was added, and the lump which arose was dissolved. Next, the ether layer was extracted, the saturation sodium-hydrogencarbonate water solution washed twice with water, and, subsequently it dried with anhydrous sodium sulfate. After desiccation, diethylether was distilled off and the white solid-state was obtained. This white solid-state was recrystallized in ethanol, and 42.2g (83% of yield) of bis-carboxylic-acid derivatives was obtained. Next, the heating dissolution of the 42.2g (0.083 mols) of this bis-carboxylic-acid derivative was carried out at n-butanol 500 ml, 2ml of sulfuric acids was added, and reflux was performed for 5 hours. Then, it returned to the room temperature and 2l. of water was filled with the reaction mixture. The obtained white solid-state was filtered and it dried. Thoria reel amine system compound which a silica gel column refines this white solid-state, and is the specified substance (instantiation compound (64)) 48.3g was obtained (91%).

[0074]

Rf=0.7 (ethyl acetate / n-hexane = 1/3)

Melting point: Magnesium metal 2.9 g (0.12 mol) was put into the 500 ml4 Thu opening flask equipped with the synthetic stirring equipment of an example of 128.8 - 129.6 ** composition 3 thoria reel amine system compound (instantiation compound (102)), a cooling pipe, nitrogen installation tubing, and a tap funnel, and the nitrogen purge was performed. Subsequently, desiccation diethylether 300 ml was put in and stirring was started. It is a screw there. - 4 and 4'-[(p-chloro methylphenyl) phenylamino] biphenyl 58.5g (0.1 mol) Diethylether solution 100 ml was dropped slowly. Reflux started gently in the place dropped about 10ml. Making it flow back, dropping of the diethylether solution was continued further and reflux was performed after dropping termination for further 1 hour. The Grignard reagent solution obtained as mentioned above was returned even to the room temperature, and then dry ice 13g was slowly added there under ice-cooling. After adding all dry ice, the reaction mixture was stirred at the room temperature for 2 hours, and the reaction was riped. Then, it hydrolyzed by dropping 100ml of water under ice-cooling. 0.1-N solution of hydrochloric acid was added, and the lump which arose was dissolved. Next, the ether layer was extracted, the saturation sodium-hydrogencarbonate water solution washed twice with water, and, subsequently it dried with anhydrous sodium sulfate. After desiccation, diethylether was distilled off and the white solid-state was obtained. This white solid-state was

recrystallized in ethanol, and 48.6g (76% of yield) of bis-carboxylic-acid derivatives was obtained. Next, the heating dissolution of the 48.6g (0.076 mols) of this bis-carboxylic-acid derivative was carried out at n-butanol 500 ml, 2ml of sulfuric acids was added, and reflux was performed for 5 hours. Then, it returned to the room temperature and 2l. of water was filled with the reaction mixture. The obtained white solid-state was filtered and it dried. The silica gel column refined this white solid-state, and 44.1g (instantiation compound (102)) of thoria reel amine system compounds which are the specified substance was obtained (81%).

[0075]

Rf=0.5 (ethyl acetate / n-hexane = 1/2)

Melting point: Magnesium metal 2.9 g (0.12 mol) was put into the 500 ml4 Thu opening flask equipped with the synthetic stirring equipment of an example of 145.2 - 146.6 ** composition 4 thoria reel amine system compound (instantiation compound (216)), a cooling pipe, nitrogen installation tubing, and a tap funnel, and the nitrogen purge was performed. Subsequently, desiccation diethylether 300 ml was put in and stirring was started. It is a screw there. - 4 and 4'-[(p-chloro methylphenyl) phenylamino] stilbene 61.1g (0.1 mol) Diethylether solution 100 ml was dropped slowly. Reflux started gently in the place dropped about 10ml. Making it flow back, dropping of the diethylether solution was continued further and reflux was performed after dropping termination for further 1 hour. The Grignard reagent solution obtained as mentioned above was returned even to the room temperature, and then dry ice 13g was slowly added there under ice-cooling. After adding all dry ice, the reaction mixture was stirred at the room temperature for 2 hours, and the reaction was riped. Then, it hydrolyzed by dropping 100ml of water under ice-cooling. 0.1-N solution of hydrochloric acid was added, and the lump which arose was dissolved. Next, the ether layer was extracted, the saturation sodium-hydrogencarbonate water solution washed twice with water, and, subsequently it dried with anhydrous sodium sulfate. After desiccation, diethylether was distilled off and the white solid-state was obtained. This white solid-state was recrystallized in ethanol, and 46.6g (74% of yield) of bis-carboxylic-acid derivatives was obtained. Next, it is the n-butanol 500 in 46.6g (0.074 mols) of this bis-carboxylic-acid derivative. The heating dissolution was carried out, 2ml of sulfuric acids was added to ml, and reflux was performed to it for 5 hours. Then, it returned to the room temperature and 2l. of water was filled with the reaction mixture. The obtained white solid-state was filtered and it dried. The silica gel column refined this white solid-state, and 45.6g (instantiation compound (216)) of thoria reel amine system compounds which are the specified substance was obtained (83%).

[0076]

Rf=0.5 (ethyl acetate / n-hexane = 1/2)

Melting point: 165.9 - 166.3 ** example 1 X-type non-metal phthalocyanine 5g and 5g (S lek BM-2, Sekisui Chemical Co., Ltd. make) of butyral resin were dissolved in cyclohexanone 90ml, and it kneaded in the ball mill for 24 hours. Applied the obtained dispersion liquid so that the thickness after desiccation might be set to 0.15 micrometers in a bar coating machine on an aluminum plate, and it was made to dry, and the charge generating layer was formed. Next, the thickness after desiccation is 25 micrometers at a blade coating machine on the charge generating layer which dissolved 5g (instantiation compound (10)) of thoria reel amine system compounds and 5g (Lexan 131-111, product made from Engineering plastics) of polycarbonate resin obtained by the synthetic example 1 in dioxane 90ml, and formed this previously. It was made to apply and dry so that it may become, and the charge transportation layer was formed.

[0077] Thus, when the cellophane tape friction test was performed about the produced electrophotography photo conductor according to JIS Z 1522, it did not separate at all. Next, when the electrophotography photo conductor completely produced by the same approach was electrified in the corona voltage of -5.5kV made in Kawaguchi Electrical-and-electric-equipment Factory and using electrostatic tracing paper testing-device EPA-8100, it is the initial surface potential V0. It was -760 V. It is the surface potential V2 after 2-second neglect in a dark place. It was set to -740V. Subsequently, oscillation wavelength 790nm semiconductor laser is irradiated and it is reduction-by-half light exposure E1/2. When it asks, it is 0.33microJ/cm2, and it is rest potential VR. It was -0.3 V. Next, V0, V2, E1/2, and VR after repeating the above-mentioned actuation 5000 times When measured, it is -750 V, -730 V, 0.33microJ/cm2, and -1.3 V, respectively, and a deposit of a crystal was not accepted at all till experimental termination after production of a photo conductor. Therefore, it turned out that the engine performance of a photo conductor hardly declines, but high endurance is shown.

[0078] Except using the thing of the compound number shown in Table 1, respectively as an example 2 - 10 charge transportation material, the photo conductor was produced like the example 1 and the performance evaluation was performed. Although the result was shown in Table 1, it is the same result as an example 1, and did not separate at all in the cellophane tape friction test.

[0079]

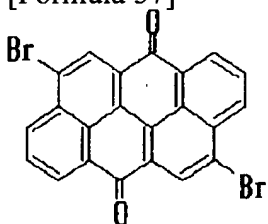
[Table 1]

		電荷輸送材		感 光 体 特 性			
				V ₀ (V)	V ₂ (V)	E _{1/2} (μJ/cm ²)	V _R (V)
実 <							

[0080] It sets in the example 11 example 1, and is the following formula (234) instead of an X type non-metal phthalocyanine. The performance evaluation was completely similarly performed except completely producing a photo conductor similarly and using the halogen lamp of illuminance 5 lux instead of the semiconductor laser of 790 nm as the exposure light source except using the shown dibromo anthanthrone as charge generating material. Consequently, V_0 of the first stage, V_2 , $E_{1/2}$, and V_R It is -730 V, -710 V, 1.2 lux-sec, and -0.5V, respectively, and they are V_0 of 5000 times after, V_2 , $E_{1/2}$, and V_R . It is -720 V, -700V, 1.2 lux-sec, and -0.9V, respectively, and is termination of a trial after production of a photo conductor. A deposit of a crystal was not accepted at all. Therefore, as for the engine performance as a photo conductor, it turned out that it excels and high endurance is shown.

[0081]

[Formula 57]



(234)

[0082] Except using the thing of the compound number shown in Table 2, respectively as an example 12 - 18 charge transportation material, the photo conductor was produced like the example 11 and the performance evaluation was performed. Although the result was shown in Table 2, it was the same result as an example 11.

[0083]

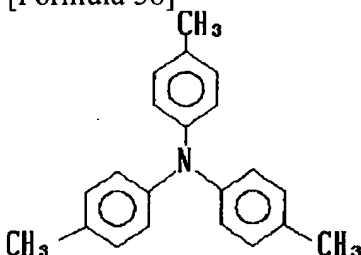
[Table 2]

		電荷輸送材		感 光 体 特 性			
				V_0 (V)	V_2 (V)	$E_{1/2}$ (lux · sec)	V_R (V)
実 施 例	12	(7)	初 回	-740	-730	1.2	-0.3
			5000回後	-730	-720	1.2	-1.0
	13	(9)	初 回	-750	-740	1.3	0
			5000回後	-740	-720	1.3	-0.5
	14	(13)	初 回	-740	-720	1.1	-0.1
			5000回後	-730	-710	1.2	-0.8
	15	(15)	初 回	-750	-740	1.2	0
			5000回後	-740	-720	1.2	-0.3
	16	(22)	初 回	-760	-750	1.2	-0.4
			5000回後	-750	-730	1.2	-1.2
	17	(27)	初 回	-770	-750	1.4	-0.7
			5000回後	-770	-740	1.4	-1.6
18	(42)	初 回	-720	-700	1.1	0	
		5000回後	-720	-700	1.2	-0.8	

[0084] It is a bottom type (235) instead of the thoria reel amine system compound expressed with a compound (10) in example of comparison 1 example 1. The photo conductor was completely similarly produced except using the thoria reel amine system compound shown. However, when saved in 1 25-degree-C dark place per day, the crystal of a thoria reel amine system compound has deposited. The performance evaluation was performed by the same approach as an example 1 using this thing. - When you made it charged in the corona voltage of 5.5kV, it is the early surface potential V_0 . It was -770 V. It is the surface potential V_2 after 2-second neglect in a dark place. It was set to -760 V. subsequently, the semiconductor laser of oscillation wavelength 790 nm -- irradiating -- reduction-by-half light exposure $E_{1/2}$ the place for which it asked -- 0.43microJ/cm² it is -- rest potential V_R It was -56.8V. Next, V_0 , V_2 , $E_{1/2}$, and V_R after repeating the above-mentioned actuation 5000 times When measured, it was -770V, -750V or 0.67microJ/cm², and -120.3 V, respectively, and was that in which the sensibility of a photo conductor and endurance are inferior.

[0085]

[Formula 58]



(235)

[0086] Thoria reel amine system compound obtained in the synthetic example 2 instead of the thoria reel amine system compound obtained by the example 1 of example 19 composition (instantiation compound (64)) The photo conductor was produced like the example 1 except using. Thus, when the cellophane tape friction test was performed about the produced electrophotography photo conductor according to JIS Z 1522, it did not separate at all. Next, as a result of performing a performance evaluation like an example 1, it is V_0 of the first stage, and V_2 , $E_{1/2}$, and V_R It is -720 V, -

710 V, 0.28microJ/cm², and -0.2 V, respectively, and they are V0 of 5000 times after, V2, E1/2, and VR. They were -710 V, -700 V, 0.28microJ/cm², and -0.7 V, respectively. Moreover, a deposit of a crystal was not accepted at all till experimental termination after production of a photo conductor. Therefore, as for the engine performance as a photo conductor, it turned out that it excels and high endurance is shown.

[0087] Except using the thing of the compound number shown in Table 3, respectively as an example 20 - 28 charge transportation material, the photo conductor was produced like the example 19 and the performance evaluation was performed. Although the result was shown in Table 3, it is the same result as an example 19, and did not separate at all in the cellophane tape friction test.

[0088]

[Table 3]

Table 5

		電荷輸送材		感 光 体 特 性			
				V_0 (V)	V_2 (V)	$E_{1/2}$ ($\mu J/cm^2$)	V_R (V)
実 施 例	20	(45)	初 回	-730	-710	0.26	0
			5000回後	-730	-700	0.26	-0.3
	21	(48)	初 回	-740	-730	0.25	-0.1
			5000回後	-730	-710	0.25	-0.5
	22	(53)	初 回	-710	-690	0.23	0
			5000回後	-700	-690	0.24	-0.4
	23	(56)	初 回	-730	-720	0.25	-0.5
			5000回後	-730	-710	0.25	-1.0
	24	(62)	初 回	-720	-700	0.24	-0.3
			5000回後	-720	-690	0.24	-1.0
	25	(64)	初 回	-730	-720	0.25	-0.7
			5000回後	-720	-700	0.25	-1.3
	26	(69)	初 回	-700	-690	0.26	-0.1
			5000回後	-690	-670	0.26	-0.7
	27	(73)	初 回	-730	-710	0.24	-0.3
			5000回後	-720	-700	0.25	-1.2
	28	(78)	初 回	-720	-710	0.25	-0.4
			5000回後	-710	-690	0.26	-0.9

[0089] Except using the thoria reel amine system compound (instantiation compound (64)) obtained in the synthetic example 2 instead of the thoria reel amine system compound obtained by the example 1 of example 29 composition, the photo conductor was produced like the example 11 and the performance evaluation was performed similarly.

Consequently, V0 of the first stage, V2, E1/2, and VR It is -760 V, -750 V, 1.1 lux-sec, and -0.3V, respectively, and they are V0 of 5000 times after, V2, E1/2, and VR. It is -740 V, -730V, 1.1 lux-sec, and -0.7V, respectively, and is termination of a trial after production of a photo conductor. A deposit of a crystal was not accepted at all. Therefore, as for the engine performance as a photo conductor, it turned out that it excels and high endurance is shown.

[0090] Except using the thing of the compound number shown in Table 4, respectively as an example 30 - 36 charge transportation material, the photo conductor was produced like the example 29 and the performance evaluation was performed. Although the result was shown in Table 4, it was the same result as an example 29.

[0091]

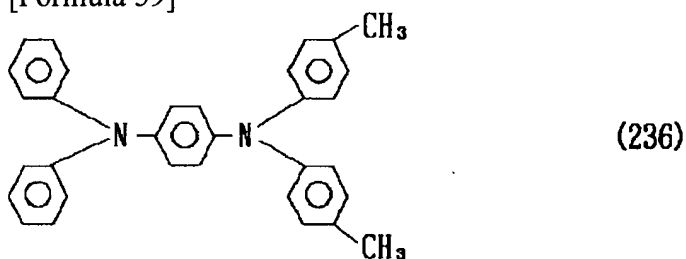
[Table 4]

		電荷輸送材		感光体特性			
				V_0 (V)	V_2 (V)	$E_{1/2}$ (lux · sec)	V_R (V)
実施例	30	(44)	初 回	-700	-690	1.0	-0.3
			5000回後	-690	-680	1.0	-1.1
	31	(52)	初 回	-730	-710	1.1	-0.4
			5000回後	-720	-700	1.1	-0.8
	32	(57)	初 回	-720	-700	1.0	-0.2
			5000回後	-710	-690	1.1	-1.0
	33	(63)	初 回	-740	-720	1.1	-0.3
			5000回後	-730	-720	1.1	-0.8
	34	(66)	初 回	-720	-700	1.0	-0.2
			5000回後	-710	-690	1.1	-0.8
	35	(75)	初 回	-760	-750	1.3	-0.9
			5000回後	-750	-740	1.4	-1.8
36	(79)	初 回	-730	-720	0.9	0	
		5000回後	-720	-700	0.9	-0.3	

[0092] It is a bottom type (236) instead of the thoria reel amine system compound expressed with a compound (64) in example of comparison 2 example 19. Except using the thoria reel amine system compound shown, the photo conductor was completely produced similarly and the performance evaluation was performed similarly. Consequently, V_0 of the first stage, V_2 , $E_{1/2}$, and V_R It is -760 V, -740 V, 0.38microJ/cm², and -38.8V, respectively, and they are V_0 and V_2 of 5000 times after, $E_{1/2}$, and V_R . It was -750 V, -740 V, 0.64microJ/cm², and -81.6V, respectively, and was that in which the sensibility of a photo conductor and endurance are inferior.

[0093]

[Formula 59]



[0094] The photo conductor was produced like the example 1 except using the thoria reel amine system compound (instantiation compound (102)) obtained in the synthetic example 3 instead of the thoria reel amine system compound obtained by the example 1 of example 37 composition. Thus, when the cellophane tape friction test was performed about the produced electrophotography photo conductor according to JIS Z 1522, it did not separate at all. Next, as a result of performing a performance evaluation like an example 1, it is V_0 of the first stage, and V_2 , $E_{1/2}$, and V_R It is -700 V, -690 V, 0.25microJ/cm², and -0.1 V, respectively, and they are V_0 of 5000 times after, V_2 , $E_{1/2}$, and V_R . They were -690 V, -680 V, 0.25microJ/cm², and -0.3 V, respectively. Moreover, a deposit of a crystal was not accepted at all till experimental termination after production of a photo conductor. Therefore, as for the engine performance as a photo conductor, it turned out that it excels and high endurance is shown.

[0095] Except using the thing of the compound number shown in Table 5, respectively as an example 38 - 46 charge

transportation material, the photo conductor was produced like the example 37 and the performance evaluation was performed. Although the result was shown in Table 5, it is the same result as an example 37, and did not separate at all in the cellophane tape friction test.

[0096]

[Table 5]

		電荷輸送材		感 光 体 特 性			
				V_0 (V)	V_2 (V)	E ($\mu J/cm^2$)	V_B (V)
実 施 例	38	(82)	初 回	-690	-680	0.24	0
			5000回後	-680	-670	0.25	-0.2
	39	(86)	初 回	-700	-690	0.25	-0.1
			5000回後	-690	-680	0.25	-0.5
	40	(91)	初 回	-680	-660	0.25	0
			5000回後	-670	-660	0.25	-0.3
	41	(94)	初 回	-700	-690	0.25	-0.1
			5000回後	-690	-680	0.25	-0.5
	42	(101)	初 回	-720	-710	0.24	-0.3
			5000回後	-720	-700	0.25	-0.6
	43	(104)	初 回	-700	-680	0.23	-0.1
			5000回後	-690	-670	0.23	-0.5
	44	(108)	初 回	-720	-710	0.25	-0.3
			5000回後	-710	-690	0.25	-1.0
	45	(113)	初 回	-730	-720	0.28	-0.6
			5000回後	-720	-710	0.28	-1.8
	46	(119)	初 回	-700	-690	0.23	0
			5000回後	-690	-670	0.23	-0.2

[0097] Thoria reel amine system compound obtained in the synthetic example 3 instead of the thoria reel amine system compound obtained by the example 1 of example 47 composition (instantiation compound (102)) Except using, the photo conductor was produced like the example 11 and the performance evaluation was performed similarly. Consequently, V_0 of the first stage, V_2 , $E_{1/2}$, and V_R It is -700 V, -680 V, 1.0 lux-sec, and -0.3V, respectively, and they are V_0 of 5000 times after, V_2 , $E_{1/2}$, and V_R . It is -690 V, -670V, 1.0 lux-sec, and -0.8V, respectively, and is termination of a trial after production of a photo conductor. A deposit of a crystal was not accepted at all. Therefore, as for the engine performance as a photo conductor, it turned out that it excels and high endurance is shown.

[0098] Except using the thing of the compound number shown in Table 6, respectively as an example 48 - 54 charge transportation material, the photo conductor was produced like the example 47 and the performance evaluation was performed. Although the result was shown in Table 6, it was the same result as an example 47.

[0099]

[Table 6]

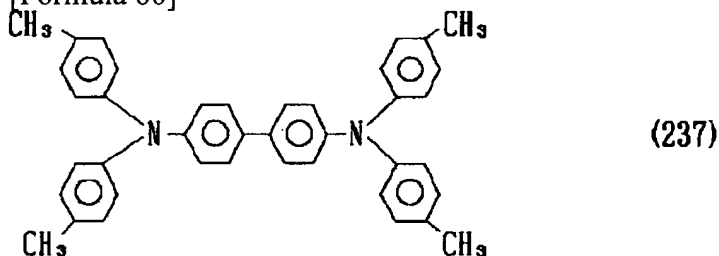
		電荷輸送材		感 光 体 特 性			
				V_0 (V)	V_2 (V)	$E_{1/2}$ (lux · sec)	V_R (V)
実 <							

[0100] It sets in the example of comparison 3 example 37, and is a compound (102). It is a bottom type (237) instead of the thoria reel amine system compound expressed. Except using the thoria reel amine system compound shown, the photo conductor was completely produced similarly and the performance evaluation was performed similarly.

Consequently, V_0 of the first stage, V_2 , $E_{1/2}$, and V_R It is -690 V, -670 V, 0.30microJ/cm², and -42.3V, respectively, and they are V_0 of 5000 times after, V_2 , $E_{1/2}$, and V_R . It is -680 V, -670 V, 0.31microJ/cm², and -93.6V, respectively, and the sensibility of a photo conductor and endurance are inferior. It was.

[0101]

[Formula 60]



[0102] The photo conductor was produced like the example 1 except using the thoria reel amine system compound (instantiation compound (216)) obtained in the synthetic example 4 instead of the thoria reel amine system compound obtained by the example 1 of example 55 composition. Thus, when the cellophane tape friction test was performed about the produced electrophotography photo conductor according to JIS Z 1522, it did not separate at all. Next, as a result of performing a performance evaluation like an example 1, they are V_0 of the first stage, V_2 , $E_{1/2}$, and V_R . It is -770V, -760V or 0.20microJ/cm², and -0V, respectively, and they are V_0 of 5000 times after, V_2 , $E_{1/2}$, and V_R . They were -760 V, -750 V, 0.20microJ/cm², and -0.3 V, respectively. Moreover, a deposit of a crystal was not accepted at all till experimental termination after production of a photo conductor. Therefore, as for the engine performance as a photo conductor, it turned out that it excels and high endurance is shown.

[0103] Except using the thing of the compound number shown in Table 7 and 8, respectively as an example 56 - 71 charge transportation material, the photo conductor was produced like the example 55 and the performance evaluation

was performed. Although the result was shown in Table 7 and 8, it is the same result as an example 55, and did not separate at all in the cellophane tape friction test.

[0104]

[Table 7]

		電荷輸送材		感 光 体 特 性			
				V_0 (V)	V_2 (V)	$E_1/2$ ($\mu\text{J}/\text{cm}^2$)	V_R (V)
実 施 例	56	(121)	初 回	-770	-760	0.30	-0.1
			5000回後	-760	-750	0.30	-0.9
	57	(132)	初 回	-780	-760	0.32	-0.3
			5000回後	-770	-750	0.32	-0.9
	58	(139)	初 回	-760	-750	0.31	-0.3
			5000回後	-750	-740	0.32	-1.0
	59	(144)	初 回	-750	-730	0.31	-0.4
			5000回後	-740	-720	0.31	-1.2
	60	(145)	初 回	-740	-730	0.29	-0.1
			5000回後	-730	-720	0.30	-0.8
	61	(151)	初 回	-730	-720	0.28	-0.3
			5000回後	-720	-710	0.29	-1.0
	62	(154)	初 回	-750	-730	0.28	-0.5
			5000回後	-740	-730	0.28	-1.3
	63	(161)	初 回	-720	-710	0.27	0
			5000回後	-710	-700	0.28	-0.5
	64	(167)	初 回	-730	-710	0.26	0
			5000回後	-720	-710	0.27	-0.6

[0105]

[Table 8]

		電荷輸送材		感 光 体 特 性			
				V_0 (V)	V_2 (V)	$E_{1/2}$ ($\mu\text{J}/\text{cm}^2$)	V_R (V)
実 施 例	65	(172)	初 回	-760	-750	0.26	-0.3
			5000回後	-750	-740	0.27	-1.2
	66	(189)	初 回	-750	-740	0.27	-0.1
			5000回後	-740	-730	0.28	-0.9
	67	(192)	初 回	-760	-750	0.28	-0.3
			5000回後	-750	-730	0.28	-1.2
	68	(197)	初 回	-730	-710	0.21	0
			5000回後	-720	-690	0.21	-0.3
	69	(208)	初 回	-720	-700	0.20	-0.1
			5000回後	-710	-690	0.20	-0.5
	70	(215)	初 回	-730	-720	0.21	-0.6
			5000回後	-730	-700	0.22	-1.0
	71	(220)	初 回	-710	-690	0.19	-0.1
			5000回後	-700	-690	0.20	-0.3

[0106] Thoria reel amine system compound obtained in the synthetic example 4 instead of the thoria reel amine system compound obtained by the example 1 of example 72 composition (instantiation compound (216)) Except using, the photo conductor was produced like the example 11 and the performance evaluation was performed similarly.

Consequently, V_0 of the first stage, V_2 , $E_{1/2}$, and V_R It is -760 V, -740 V, 0.9 lux-sec, and -0.3V, respectively, and they are V_0 of 5000 times after, V_2 , $E_{1/2}$, and V_R . It is -750 V, -720V, 0.9 lux-sec, and -0.8V, respectively, and is termination of a trial after production of a photo conductor. A deposit of a crystal was not accepted at all. Therefore, as for the engine performance as a photo conductor, it turned out that it excels and high endurance is shown.

[0107] Except using the thing of the compound number shown in Table 9, respectively as an example 73 - 80 charge transportation material, the photo conductor was produced like the example 72 and the performance evaluation was performed. Although the result was shown in Table 9, it was the same result as an example 72.

[0108]

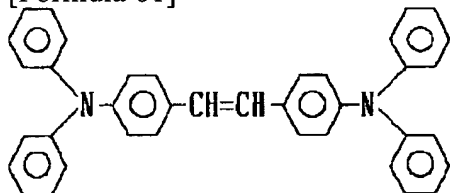
[Table 9]

		電荷輸送材		感 光 体 特 性			
				V_0 (V)	V_2 (V)	$E_{1/2}$ (lux · sec)	V_R (V)
実 施 例	73	(124)	初 回	-750	-730	1.2	-0.3
			5000回後	-740	-720	1.2	-0.8
	74	(133)	初 回	-740	-730	1.1	-0.5
			5000回後	-730	-710	1.2	-1.4
	75	(145)	初 回	-720	-700	1.2	-0.7
			5000回後	-710	-690	1.2	-1.2
	76	(162)	初 回	-730	-710	1.0	-0.2
			5000回後	-720	-700	1.0	-0.8
	77	(183)	初 回	-740	-710	1.0	-0.1
			5000回後	-730	-720	1.1	-0.8
	78	(197)	初 回	-720	-690	0.8	0
			5000回後	-710	-690	0.9	-0.1
	79	(220)	初 回	-720	-700	0.9	-0.3
			5000回後	-710	-690	0.9	-0.8
	80	(233)	初 回	-720	-710	1.0	-0.4
			5000回後	-720	-700	1.0	-0.9

[0109] It sets in the example of comparison 4 example 55, and is a compound (216). It is a bottom type (238) instead of the thoria reel amine system compound expressed. Except using the thoria reel amine system compound shown, the photo conductor was completely produced similarly and the performance evaluation was performed similarly. Consequently, V_0 of the first stage, V_2 , $E_{1/2}$, and V_R It is -670 V, -640 V, 0.39microJ/cm², and -53.3V, respectively, and they are V_0 of 5000 times after, V_2 , $E_{1/2}$, and V_R . It is -570 V, -510 V, 0.52microJ/cm², and -144.6 V, respectively, and the sensibility of a photo conductor and endurance are inferior. It was.

[0110]

[Formula 61]



(238)

[Translation done.]